

CHAPTER 41 WATER SUPPLIES

[These rules transferred from Health Department, 1971 IDR (Title II, Chs 1 and 2)]

[Prior to 7/1/83, DEQ Ch 22]

[Prior to 12/3/86, Water, Air and Waste Management[900]]

567—41.1(455B) Primary drinking water regulations—coverage. Rules 41.2(455B) to 41.5(455B) and 567—43.2(455B) shall apply to each public water supply system, unless the public water supply system meets all of the following conditions:

1. Consists only of distribution and storage facilities (and does not have any collection and treatment facilities);
2. Obtains all of its water from, but is not owned or operated by, a public water supply system to which such regulations apply;
3. Does not sell water to any person; and
4. Is not a carrier which conveys passengers in interstate commerce.

567—41.2(455B) Biological maximum contaminant levels (MCL) and monitoring requirements.

41.2(1) *Coliforms, fecal coliforms and E. coli.*

a. Applicability. These rules apply to all public water supply systems.

b. Maximum contaminant levels (MCL) for total coliforms, fecal coliforms/E. coli.

(1) The MCL is based on the presence or absence of total coliforms in a sample. The system is in compliance with MCL requirements for total coliform if it meets the following requirements:

1. For a system which collects 40 samples or more per month, no more than 5.0 percent of the samples collected during a month may be total coliform-positive.

2. For a system which collects less than 40 samples per month, no more than one sample collected during a month may be total coliform-positive.

(2) Any fecal coliform-positive repeat sample or *E. coli*-positive repeat sample, or any total coliform-positive repeat sample following a fecal coliform-positive or *E. coli*-positive routine sample constitutes a violation of the MCL for total coliforms. For purposes of the public notification requirements in 41.10(2)“a”(2), this is a violation that may pose an acute risk to health.

(3) Compliance of a system with the MCL for total coliforms in 41.2(1)“b”(1) and (2) is based on each month in which the system is required to monitor for total coliforms.

(4) Results of all routine and repeat samples not invalidated by the department or laboratory must be included in determining compliance with the MCL for total coliforms.

c. Monitoring requirements.

(1) Routine total coliform monitoring.

1. Public water supply systems must collect total coliform samples at sites which are representative of water throughout the distribution system according to a written sample siting plan. The plan shall be reviewed or updated by the public water supply system every two years and shall be retained on file at the facility. Major elements of the plan shall include, but are not limited to, a map of the distribution system, notation or a list of routine sample location(s) for each sample period, resample locations for each routine sample, and a log of samples taken. The plan must be made available to the department upon request and during sanitary surveys and must be revised by the system as directed by the department.

2. The public water supply system must collect samples at regular time intervals throughout the month, except that a system which uses only groundwater (except groundwater under the direct influence of surface water, as defined in 567—paragraph 43.5(1)“b”) and serves 4,900 persons or fewer, may collect all required samples on a single day if they are taken from different sites.

3. Community water systems. The monitoring frequency for total coliforms for community water systems and noncommunity water systems serving schools, to include preschools and day care centers, is based on the population served by the system as listed below, until June 29, 1994. Public water

systems which do not collect five or more routine samples each month must undergo an initial sanitary survey by June 29, 1994. After June 29, 1994, the monitoring frequency for systems serving less than 4,101 persons shall be a minimum of five routine samples per month unless the department determines, after completing sanitary surveys (at intervals not to exceed five years), that the monitoring frequency may continue as listed below. The monitoring frequency for regional water systems shall be as listed in 41.2(1) "c"(1)"4" but in no instance less than that required by the population equivalent served.

Total Coliform Monitoring Frequency for Community
Water Systems and Noncommunity (School) Water Systems

<u>Population Served</u>	<u>Minimum Number of Samples Per Month</u>
25 to 1,000*	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270

*Includes public water supply systems which have at least 15 service connections, but serve fewer than 25 persons

4. Regional water systems. The supplier of water for a regional water system as defined in rule 567—40.2(455B) shall sample for coliform bacteria at a frequency indicated in the following chart until June 29, 1994, but in no case shall the sampling frequency for a regional water system be less than as set forth in 41.2(1) "c"(1)"3" based on the population equivalent served. Public water systems which do not collect five or more routine samples each month must undergo an initial sanitary survey by June 29, 1994. After June 29, 1994, the monitoring frequency of systems with less than 82 miles of pipe shall be a minimum of five routine samples per month unless the department determines, after

completing sanitary surveys (at intervals not exceeding five years), that the monitoring frequency may continue as listed below. The following chart represents sampling frequency per miles of distribution system and is determined by calculating one-half the square root of the miles of pipe.

Total Coliform Monitoring Frequency for
Regional Water Systems

<u>Miles of Pipe</u>	<u>Minimum Number of Samples Per Month</u>
0 - 9	1
10 - 25	2
26 - 49	3
50 - 81	4
82 - 121	5
122 - 169	6
170 - 225	7
226 - 289	8
290 - 361	9
362 - 441	10
442 - 529	11
530 - 625	12
626 - 729	13
730 - 841	14
842 - 961	15
962 - 1,089	16
1,090 - 1,225	17
1,226 - 1,364	18
1,365 - 1,521	19
1,522 - 1,681	20
1,682 - 1,849	21
1,850 - 2,025	22
2,026 - 2,209	23
2,210 - 2,401	24
2,402 - 2,601	25
2,602 - 3,249	28
3,250 - 3,721	30
3,722 - 4,489	33
greater than 4,489	35

5. Noncommunity water systems. The monitoring frequency for total coliforms for noncommunity water systems is as listed in the four unnumbered paragraphs below until June 29, 1999. Public water systems which do not collect five or more routine samples each month must undergo an initial sanitary survey by June 29, 1999. After June 29, 1999, the minimum number of samples shall be five routine samples per month unless the department determines, after completing sanitary surveys (at intervals not exceeding five years), that the monitoring frequency may continue as listed below.

A noncommunity water system using only groundwater (except groundwater under the direct influence of surface water, as defined in 567—43.5 (1)“b”) and serving 1,000 persons or fewer must monitor each calendar quarter that the system provides water to the public. Systems serving more than 1,000

persons during any month must monitor at the same frequency as a like-sized community water system, as specified in 41.2(1)“c”(1)“3.”

A noncommunity water system using surface water, in total or in part, must monitor at the same frequency as a like-sized community water system, as specified in 41.2(1)“c”(1)“3,” regardless of the number of persons it serves.

A noncommunity water system using groundwater under the direct influence of surface water, as defined in 567—43.5(1)“b,” must monitor at the same frequency as a like-sized community water system, as specified in 41.2(1)“c”(1)“3.” The system must begin monitoring at this frequency beginning six months after the department determines that the groundwater is under the direct influence of surface water.

A noncommunity water system serving schools must monitor at the same frequency as a like-sized community water system, as specified in 41.2(1)“c”(1)“3.”

6. If the department, on the basis of a sanitary survey or on the basis of the monitoring results history, determines that some greater frequency of monitoring is more appropriate, that frequency shall be the frequency required under these regulations. This frequency shall be confirmed or changed on the basis of subsequent surveys.

7. Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, shall not be used to determine compliance with the MCL for total coliforms in 41.2(1)“b.” Repeat samples taken pursuant to 41.2(1)“c”(2) are not considered special purpose samples and must be used to determine compliance with the MCL for total coliforms in 41.2(1)“b.”

(2) Repeat total coliform monitoring.

1. Repeat sample time limit and numbers. If a routine sample is total coliform-positive, the public water supply system must collect a set of repeat samples within 24 hours of being notified of the positive result and in no case more than 24 hours after being notified by the department. A system which collects more than one routine sample per month must collect no fewer than three repeat samples for each total coliform-positive sample found. A system which collects one routine sample per month or fewer must collect no fewer than four repeat samples for each total coliform-positive sample found. The department may extend the 24-hour limit on a case-by-case basis if the system has a logistical problem in collecting the repeat samples within 24 hours that is beyond its control. In those cases, the public water supply system must report the circumstances to the department no later than the end of the next business day after receiving the notice to repeat sample and initiate the action directed by the department. In the case of an extension, the department will specify how much time the system has to collect the repeat samples.

2. Repeat sample location(s). The system must collect at least one repeat sample from the sampling tap where the original total coliform-positive sample was taken, at least one repeat sample at a tap within five service connections upstream and at least one repeat sample at a tap within five service connections downstream of the original sampling site. If a total coliform-positive sample is at the end of the distribution system, or at the first or last service connection, the system will be required to collect the repeat samples from the original sampling site and locations only upstream or downstream.

3. The system must collect all repeat samples on the same day, except that the department may allow a system with a single service connection to collect the required set of repeat samples over a four-day period. “System with a single service connection” means a system which supplies drinking water to consumers through a single service line.

4. Additional repeat sampling. If one or more repeat samples in the set is total coliform-positive, the public water supply system must collect an additional set of repeat samples in the manner specified in 41.2(1)“c”(2)“1” to 41.2(1)“c”(2)“3.” The system must repeat this process until either total coliforms are not detected in one complete set of repeat samples or the system determines that the MCL for total coliforms in 41.2(1)“b” has been exceeded, notifies the department, and provides public notification to its users.

5. If a system collecting fewer than five routine samples per month has one or more total coliform-positive samples and the department does not invalidate the sample(s) under 41.2(1)“c”(3), it

must collect at least five routine samples during the next month the system provides water to the public. For systems monitoring on a quarterly basis, the additional five routine samples may be required to be taken within the same quarter in which the original total coliform-positive sample occurred.

The department may waive the requirement to collect five routine samples the next month the system provides water to the public if the department has determined that the sample was total coliform-positive and establishes that the system has corrected the problem or will correct the problem before the end of the next month the system serves water to the public. In this case, the department must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the water supply section and the department official who recommends such a decision, and make this document available to the EPA and public. The written documentation will generally be provided by the public water supply system in the form of a request and must describe the specific cause of the total coliform-positive sample and what action the system has taken to correct the problem. The department will not waive the requirement to collect five routine samples the next month the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. Under this paragraph, a system must still take at least one routine sample before the end of the next month it serves water to the public and use it to determine compliance with the MCL for total coliforms in 41.2(1)"b."

(3) Invalidation of total coliform samples. A total coliform-positive sample invalidated under this subparagraph does not count towards meeting the minimum monitoring requirements of 41.2(1) "c." The department may invalidate a total coliform-positive sample only if one or more of the following conditions are met.

1. The laboratory establishes that improper sample analysis caused the total coliform-positive result. A laboratory must invalidate a total coliform sample (unless total coliforms are detected, in which case, the sample is valid) if the sample produces a turbid culture in the absence of gas production using an analytical method where gas formation is examined (e.g., the multiple tube fermentation technique), produces a turbid culture in the absence of an acid reaction in the presence-absence (P-A) coliform test, or exhibits confluent growth or produces colonies too numerous to count with an analytical method using a membrane filter (e.g., membrane filter technique). If a laboratory invalidates a sample because of such interference, the system must collect another sample from the same location as the original sample within 24 hours of being notified of the interference problem, and have it analyzed for the presence of total coliforms. The system must continue to resample within and have the samples analyzed until it obtains a valid result. The department may waive the 24-hour time limit on a case-by-case basis.

2. The department, on the basis of the results of repeat samples collected as required by 41.2(1)"c"(2)"1" to "4," determines that the total coliform-positive sample resulted from a domestic or other nondistribution system plumbing problem. "Domestic or other nondistribution system plumbing problem" means a coliform contamination problem in a public water supply system with more than one service connection that is limited to the specific service connection from which the coliform-positive sample was taken. The department will not invalidate a sample on the basis of repeat sample results unless all repeat samples collected at the same tap as the original total coliform-positive sample are also total coliform-positive, and all repeat samples collected within five service connections of the original tap are total coliform-negative (e.g., the department will not invalidate a total coliform-positive sample on the basis of repeat samples if all the repeat samples are total coliform-negative, or if the public water supply system has only one service connection).

3. The department has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. In this case, the system must still collect all repeat samples required under 41.2(1)"c"(2)"1" to "4," and use them to determine compliance with the MCL for total coliforms in 41.2(1)"b." To invalidate a total coliform-positive sample under this paragraph, the decision with the rationale for the decision must be documented in writing and approved and signed by the supervisor of the water supply section and the department official who recommended the decision. The department must make this document available to EPA and the public. The written documentation generally provided by the public water supply sys-

tem in the form of a request must state the specific cause of the total coliform-positive sample, and what action the system has taken to correct this problem. The department will not invalidate a total coliform-positive sample solely on the grounds of poor sampling technique or that all repeat samples are total coliform-negative.

(4) Fecal coliforms/*Escherichia coli* (*E. coli*) testing.

1. If any routine or repeat sample is total coliform-positive, the system must analyze that total coliform-positive culture medium to determine if fecal coliforms are present, except that the system may test for *E. coli* in lieu of fecal coliforms.

2. The department may allow a public water supply system, on a case-by-case basis, to forego fecal coliform or *E. coli* on a total coliform-positive sample if that system assumes that the total coliform-positive sample is fecal coliform-positive or *E. coli*-positive. Accordingly, the system must notify the department as specified in 41.2(1)“c”(5)“1” and meet the provisions of 41.10(2) pertaining to public notification.

(5) Public water supply system’s response to violation.

1. A public water supply system which has exceeded the MCL for total coliforms in 41.2(1)“b” must report the violation to the water supply section of the department by telephone no later than the end of the next business day after it learns of the violation, and notify the public in accordance with 41.10(2)“a.”

2. A public water supply system which has failed to comply with a coliform monitoring requirement must report the monitoring violation to the department within ten days after the system discovers the violation and notify the public in accordance with 41.10(2)“b.”

3. If fecal coliforms or *E. coli* are detected in a routine or repeat sample, the system must notify the department by telephone by the end of the day when the system is notified of the test result, unless the system is notified of the result after the department office is closed, in which case the system must notify the department before the end of the next business day and notify the public in accordance with 41.10(2)“a”(1) and (2).

d. *Best available technology (BAT)*. The U.S. EPA identifies, and the department has adopted, the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant level for total coliforms in 41.2(1)“b.”

(1) Protection of wells from contamination by coliforms by appropriate placement and construction;

(2) Maintenance of a disinfectant residual throughout the distribution system;

(3) Proper maintenance of the distribution system including appropriate pipe replacement and repair procedures, main flushing programs, proper operation and maintenance of storage tanks and reservoirs, and continual maintenance of a minimum positive water pressure of 20 psig in all parts of the distribution system at all times; and

(4) Filtration or disinfection of surface water in accordance with 567—43.5(455B) or disinfection of groundwater using strong oxidants such as, but not limited to, chlorine, chlorine dioxide, or ozone.

e. *Analytical methodology*.

(1) The standard sample volume required for total coliform analysis, regardless of analytical method used, is 100 ml.

(2) Public water supply systems shall determine the presence or absence of total coliforms. A determination of total coliform density is not required.

(3) Total coliform analyses. Public water supply systems must conduct total coliform analyses in accordance with one of the following analytical methods:

1. Multiple-Tube Fermentation (MTF) Technique, as set forth in “Standard Methods,” Method 9921, 9921A, and 9921B—pp. 9-66 to 9-75, except that ten fermentation tubes must be used; or “Microbiological Methods for Monitoring the Environment, Water and Wastes,” U.S. EPA, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA-600/8-78-017, December 1978, available from ORD Publications, CERL, U.S. EPA, Cincinnati, Ohio 45268), Part III, Section B. 2.1-2.6.4, pp. 114-118 (Most Probable Number Method), except that ten fermentation tubes must be used; or

2. Membrane Filter (MF) Technique, as set forth in "Standard Methods," Method 9222A, 9222B, and 9222C-pp. 9-82 to 9-93; or "Microbiological Methods for Monitoring the Environment, Water and Wastes," U.S. EPA, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA-600/8-78-017, December 1978, available from ORD Publications, CERL, U.S. EPA, Cincinnati, Ohio 45268), Part III, Section B. 2.1-2.6, pp. 108-112; or

3. Presence-Absence (P-A) Coliform Test, as set forth in "Standard Methods," Method 9921E-pp. 9-80 to 9-82; or

4. Minimal Medium ONPG-MUG (MMO-MUG) Test, as set forth in the article "National Field Evaluation of a Defined Substrate Method for the Simultaneous Detection of Total Coliform and *Escherichia coli* from Drinking Water: Comparison with Presence-Absence Techniques" (Edberg, et al.), Applied and Environmental Microbiology, Volume 55, pp. 1003-1008, April 1989. (NOTE: The MMO-MUG Test is sometimes referred to as the Autoanalysis Colilert System.) The MMO-MUG Test with hepes buffer in lieu of phosphate buffer is an acceptable minor revision.

(4) In lieu of the 10-tube MTF Technique specified in 41.2(1)"e"(3)"1," a public water supply system may use the MTF Technique using either five tubes (20-ml sample portions) or a single culture bottle containing the culture medium for the MTF Technique, i.e., lauryl tryptose broth (formulated as described in "Standard Methods," Method 9221 B-p. 9-68), as long as a 100 ml water sample is used in the analysis.

(5) Fecal coliform analysis. Public water systems must conduct fecal coliform analysis in accordance with the following procedure. When the MTF Technique of presence-absence (P-A) coliform test is used to test for total coliforms, shake the lactose-positive presumptive tube or P-A bottle vigorously and transfer the growth with a sterile 3-mm loop or sterile applicator stick into brilliant green lactose bile broth and EC medium to determine the presence of total and fecal coliforms, respectively. For EPA-approved analytical methods which use a membrane filter, remove the membrane containing the total coliform colonies from the substrate with sterile forceps and carefully curl and insert the membrane into a tube of EC medium. (The laboratory may first remove a small portion of selected colonies for verification.) Gently shake the inoculated EC tubes to ensure adequate mixing and incubate in a waterbath at 44.5 (+ or -) 0.2 degrees C for 24 (+ or -) 2 hours. Gas production of any amount in the inner fermentation tube of the EC medium indicates a positive fecal coliform test. The preparation of EC medium is described in "Standard Methods," Method 9921C-p. 9-75, paragraph 1a. Public water supply systems need only determine the presence or absence of fecal coliforms; a determination of fecal coliform density is not required.

(6) *E. coli* analysis. Public water systems must conduct analysis of *Escherichia coli* (*E. coli*) in accordance with one of the following analytical methods:

1. EC medium supplemented with 50 micrograms per liter of 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration). EC medium is described in Standard Methods, 16th Edition, p. 879. MUG may be added to EC medium before autoclaving. EC medium supplemented with 50 micrograms per liter of MUG is commercially available. At least 10 ml of EC medium supplemented with MUG must be used. The inner inverted fermentation tube may be omitted. The procedure for transferring a total coliform-positive culture to EC medium supplemented with MUG shall be as specified in 41.2(1)"e"(5) for transferring a total coliform-positive culture to EC medium. Observe fluorescence with an ultraviolet light (366 nm) in the dark after incubating tube at 44.5 plus or minus 0.2 degrees Celsius for 24 plus or minus 2 hours.

2. Nutrient agar supplemented with 100 micrograms per ml 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration). Nutrient agar is described in Standard Methods, 16th Edition, p. 874. This test is used to determine if a total coliform-positive sample, as determined by the Membrane-Filter Technique or any other method in which a membrane filter is used, contains *E. coli*. Transfer the membrane filter containing a total coliform colony(ies) to nutrient agar supplemented with 100 micrograms per ml (final concentration) of MUG. After incubating the agar plate at 35 degrees Celsius for 4 hours, observe the colony(ies) under ultraviolet light (366 nm) in the dark for fluorescence. If fluorescence is visible, *E. coli* are present.

3. Minimal Medium ONPG-MUG (MMO-MUG) Test, as set forth in the article “National Field Evaluation of a Defined Substrate Method for the Simultaneous Detection of Total Coliforms and *Escherichia coli* from Drinking Water: Comparisons with Presence-Absence Techniques” (Edberg et al.), Applied and Environmental Microbiology, Volume 55, pp. 1003-1008, April 1989. (Note: The Autoanalysis Colilert System is an MMO-MUG test.) If the MMO-MUG Test is total coliform-positive after a 24-hour incubation, test the medium for fluorescence with a 366-nm ultraviolet light (preferably with a 6-watt lamp) in the dark. If fluorescence is observed, the sample is *E. coli*-positive. If fluorescence is questionable (cannot be definitively read) after 24 hours incubation, incubate the culture for an additional 4 hours (but not to exceed 28 hours total), and again test the medium for fluorescence. The MMO-MUG Test with hepes buffer is the only approved formulation for the detection of *E. coli*.

(7) As an option to 41.2(1)“e”(6) a system with a total coliform-positive, MUG-negative, MMO-MUG Test may further analyze the culture for the presence of *E. coli* by transferring a 0.1 ml, 28-hour MMO-MUG culture to EC Medium + MUG with a pipette. The formulation and incubation conditions of EC Medium + MUG and observation of the results are described in 41.2(1)“e”(6).

41.2(2) *Giardia*. Reserved.

41.2(3) *Heterotrophic plate count bacteria (HPC)*.

a. Applicability. All public water systems that use a surface water source or source under the direct influence of surface water must provide treatment consisting of disinfection, as specified in 567—subrule 43.5(2), and filtration treatment which complies with 567—subrule 43.5(3). The heterotrophic plate count is an alternate method to demonstrate a detectable disinfectant residual in accordance with 567—paragraph 43.5(2)“d.”

b. Maximum contaminant levels. Reserved.

c. Monitoring requirements. Reserved.

d. BAT. Reserved.

e. Analytical methodology. Public water systems shall conduct heterotrophic plate count bacteria analysis in accordance with 567—subrule 43.5(2) and the following analytical method. Measurements for heterotrophic plate count bacteria must be conducted by a laboratory certified by the department to do such analysis. Until laboratory certification criteria are developed for the analysis of heterotrophic plate count bacteria, any laboratory certified for total coliform analysis by the department is certified for heterotrophic plate count bacteria analysis. After certification criteria have been established, the laboratory shall meet the criteria at renewal of certification.

(1) The heterotrophic plate count shall be performed in accordance with Method 9215B (Pour Plate Method), pp. 9-58 to 9-61, as set forth in “Standard Methods.”

(2) Reporting. The public water system shall report the results of heterotrophic plate count in accordance with 567—paragraph 43.7(3)“b.”

41.2(4) *Macroscopic organisms and algae*.

a. Applicability. These rules apply to both community and noncommunity public water supply systems using surface water or groundwater under direct influence of surface water as defined by 567—subrule 43.5(1).

b. Maximum contaminant levels (MCLs) for macroscopic organisms and algae. Finished water shall be free of any macroscopic organisms such as plankton, worms, or cysts. The finished water algal cell count shall not exceed 500 organisms per milliliter or 10 percent of the total cells found in the raw water, whichever is greater. Compliance with the maximum contaminant level for algal cells is calculated in accordance with 41.2(4)“c.”

c. Monitoring requirements. Reserved.

d. BAT. Reserved.

e. Analytical methodology. Measurement of the algal cells shall be in accordance with Method 10200F, “Standard Methods,” pp. 10-23 to 10-28. Such measurement shall be required only when the department determines on the basis of complaints or otherwise that excessive algal cells are present.

567—41.3(455B) Maximum contaminant levels (MCLs) and monitoring requirements for inorganic contaminants other than lead or copper.**41.3(1) MCLs and other requirements for inorganic contaminants.**

a. Applicability. Maximum contaminant levels for inorganic contaminants (IOCs) specified in 41.3(1)“b” apply to community water systems and nontransient noncommunity water systems as specified herein. The maximum contaminant level specified for fluoride applies only to community water systems. The maximum contaminant levels specified for nitrate, nitrite, and total nitrate and nitrite apply to community, nontransient noncommunity, and transient noncommunity water systems. The requirements also contain monitoring requirements, best available technology (BAT) identification, and analytical method requirements pursuant to 41.3(1)“c,” “d,” and “e,” respectively.

b. Maximum contaminant levels for inorganic chemicals (IOCs).

(1) The following table specifies the MCLs for IOCs:

<u>Iowa Contaminant Code</u>	<u>Contaminant</u>	<u>MCL (mg/l)</u>
1074	Antimony	0.006
1005	Arsenic	0.05
1094	Asbestos	7 million fibers/liter (longer than 10 micrometers)
1010	Barium	2
1075	Beryllium	0.004
1015	Cadmium	0.005
1020	Chromium	0.1
1024	Cyanide (as free Cyanide)	0.2
1025	Fluoride*	4.0
1035	Mercury	0.002
1036	Nickel	0.1
1040	Nitrate	10 (as nitrogen)
1041	Nitrite	1 (as nitrogen)
1038	Total Nitrate and Nitrite	10 (as nitrogen)
1045	Selenium	0.05
1085	Thallium	0.002

*The recommended fluoride level is 1.1 milligrams per liter or the level as calculated from “Water Fluoridation, a Manual for Engineers and Technicians” Table 2-4 published by the U.S. Department of Health and Human Services, Public Health Service (September 1986). At this optimum level in drinking water fluoride has been shown to have beneficial effects in reducing the occurrence of tooth decay.

(2) Compliance calculations. Compliance with 41.3(1)“b”(1) shall be determined based on the analytical result(s) obtained at each source/entry point.

1. Sampling frequencies greater than annual. For public water supply systems which are conducting monitoring at a frequency greater than annual, compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, and thallium is determined by a running annual average at any sampling point. If the average at any sampling point is greater than the MCL, then the system is out of compliance. If any one sample would cause the annual average to be exceeded, then the system is out of compliance immediately. Any sample below the method detection limit shall be calculated at zero for the purpose of determining the annual average.

2. Sampling frequencies of annual or less. For public water supply systems which are monitoring annually, or less frequently, the system is out of compliance with the maximum contaminant levels for arsenic, asbestos, barium, cadmium, chromium, fluoride, mercury, and selenium if the level of a con-

taminant at any sampling point is greater than the MCL. If a confirmation sample is required by the department, the determination of compliance will be based on the average of the two samples.

3. Compliance calculations for nitrate and nitrite. Compliance with the maximum contaminant levels for nitrate and nitrite is determined based on one sample if the level of these contaminants is below the MCLs. If the level of nitrate or nitrite exceeds the MCLs in the initial sample, a confirmation sample is required in accordance with 41.3(1)“c”(7)“2,” and compliance shall be determined based on the average of the initial and confirmation samples.

4. Separable distribution systems. If a public water system has a distribution system separable from other parts of the distribution system with no interconnections, the department may allow the system to give public notice to only the area served by that portion of the system which is out of compliance.

c. Inorganic chemicals—monitoring requirements.

(1) Routine IOC monitoring. Community public water supply systems and nontransient noncommunity water systems shall conduct monitoring to determine compliance with the MCLs specified in 41.3(1)“b” in accordance with this subrule. Transient noncommunity water systems shall conduct monitoring to determine compliance with the nitrate and nitrite maximum contaminant levels in 41.3(1)“b” as required by 41.3(1)“c”(5) and (6).

(2) Department designated sampling schedules: Each public water system shall monitor at the time designated by the department during each compliance period. The monitoring protocol is as follows:

1. Groundwater sampling points. Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a source/entry point) beginning in the compliance period starting January 1, 1993. The system shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

2. Surface water sampling points. Surface water systems shall take a minimum of one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a source/entry point) beginning in the compliance period starting January 1, 1993. (For purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.) The system shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

3. Multiple sources. If a public water supply system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

4. Composite sampling. The department may reduce the total number of samples which must be analyzed by the use of compositing. In systems serving less than or equal to 3,300 persons, composite samples from a maximum of five samples are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory. If the concentration in the composite sample is greater than or equal to one-fifth of the MCL of any inorganic chemical, then a follow-up sample must be taken within 14 days at each sampling point included in the composite. These samples must be analyzed for the contaminants which exceeded one-fifth of the MCL in the composite sample. Detection limits for each analytical method and MCLs for each inorganic contaminant are the following:

DETECTION LIMITS FOR INORGANIC CONTAMINANTS

<u>Contaminant</u>	<u>MCL (mg/l)</u>	<u>Methodology</u>	<u>Detection limit (mg/l)</u>
Antimony	0.006	Atomic Absorption; furnace technique	0.003
		Atomic Absorption; Platform	0.0008 ⁶
		ICP—Mass Spectrometry	0.0004
		Hydride-Atomic Absorption	0.001
Asbestos	7 MFL ²	Transmission Electron Microscopy	0.01 MFL ²
Barium	2	Atomic Absorption; furnace technique	0.002
		Atomic Absorption; direct aspiration	0.1
		Inductively Coupled Plasma	0.002 (0.001) ¹
Beryllium	0.004	Atomic Absorption; furnace technique	0.0002
		Atomic Absorption; Platform	0.00002 ⁶
		Inductively Coupled Plasma ³	0.0003
		ICP—Mass Spectrometry	0.0003
Cadmium	0.005	Atomic Absorption; furnace technique	0.0001
		Inductively Coupled Plasma	0.001 ¹
Chromium	0.1	Atomic Absorption; furnace technique	0.001
		Inductively Coupled Plasma	0.007 (0.001) ¹
Cyanide	0.2	Distillation, Spectrophotometric ⁴	0.02
		Distillation, Automated, Spectrophotometric ⁴	0.005
		Distillation, Selective Electrode ⁴	0.05
		Distillation, Amenable, Spectrophotometric ⁵	0.02
Mercury	0.002	Manual Cold Vapor Technique	0.0002
		Automated Cold Vapor Technique	0.0002
Nickel	0.1	Atomic Absorption; furnace technique	0.001 (0.0006) ⁶
		Inductively Coupled Plasma ³	0.005
		ICP—Mass Spectrometry	0.0005
Nitrate	10 (as N)	Manual Cadmium Reduction	0.01
		Automated Hydrazine Reduction	0.01
		Automated Cadmium Reduction	0.05
		Ion Selective Electrode	1
		Ion Chromatography	0.01
Nitrite	1 (as N)	Spectrophotometric	0.01
		Automated Cadmium Reduction	0.05
		Manual Cadmium Reduction	0.01
		Ion Chromatography	0.004
Selenium	0.05	Atomic Absorption; furnace technique	0.002
		Atomic Absorption; gaseous hydride	0.002
Thallium	0.002	Atomic Absorption; furnace technique	0.001 (0.0007) ⁶
		ICP—Mass Spectrometry	0.0003

¹Using concentration technique in Appendix A to EPA Method 200.7.²MFL = million fibers per liter greater than 10 micrometers.³Using a 2 x preconcentration step as noted in Method 200.7. Lower MDLs may be achieved when using a 4 x preconcentration.⁴Screening method for total cyanides.⁵Measures "free" cyanides.⁶Lower MDLs are reported using stabilized temperature graphite furnace atomic absorption.

If duplicates of the original sample taken from each sampling point used in the composite are available, the system may use these instead of resampling. The duplicates must be analyzed and the results reported to the department within 14 days of collection. If the population served by the system is greater than 3,300 persons, then compositing may only be permitted by the department as sampling points within a single system. In systems serving less than or equal to 3,300 persons, the department may permit compositing among different systems provided the five-sample limit is maintained.

(3) Asbestos routine and repeat monitoring frequency. The frequency of monitoring conducted to determine compliance with the maximum contaminant level for asbestos specified in 41.3(1)“b” shall be conducted as follows:

1. Initial sampling frequency. Each community and nontransient noncommunity water system is required to monitor for asbestos during the first three-year compliance period of each nine-year compliance cycle beginning in the compliance period starting January 1, 1993.

2. Sampling during waiver. If the public water supply system believes it is not vulnerable to either asbestos contamination in its source water or due to corrosion of asbestos-cement pipe, or both, it may apply for a waiver of the monitoring requirement in 41.3(1)“c”(3)“1.” If the department grants the waiver, the system is not required to monitor.

3. Bases of an asbestos waiver. The department may grant a waiver based on a consideration of potential asbestos contamination of the water source, and also upon the use of asbestos-cement pipe for finished water distribution and the corrosive nature of the water.

4. Effect of an asbestos waiver. A waiver remains in effect until the completion of the three-year compliance period. Systems not receiving a waiver must monitor in accordance with 41.3(1)“c”(3)“1.”

5. Distribution system vulnerability for asbestos. A public water supply system vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.

6. Source water vulnerability for asbestos. A public water supply system vulnerable to asbestos contamination due solely to source water shall monitor in accordance with the provision of 41.3(1)“c”(2).

7. Combined asbestos vulnerability. A public water supply system vulnerable to asbestos contamination due both to its source water supply and corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.

8. Exceedance of the asbestos MCL. A public water supply system which exceeds the maximum contaminant levels as determined in 41.3(1)“b” shall monitor quarterly beginning in the next quarter after the violation occurred.

9. Asbestos reliably and consistently below the MCL. The department may decrease the quarterly monitoring requirement to the frequency specified in 41.3(1)“c”(3)“1” provided the system is reliably and consistently below the maximum contaminant level. In no case can the department make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface (or combined surface/ground) water system takes a minimum of four quarterly samples.

10. Grandfathered asbestos data. If monitoring data collected after January 1, 1990, are generally consistent with the requirements of 41.3(1)“c”(3), then the department may allow public water supply systems to use that data to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.

(4) Monitoring frequency for other IOCs. The frequency of monitoring conducted to determine compliance with the maximum contaminant levels in 41.3(1)“b” for antimony, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, and thallium shall be as follows:

1. IOCs sampling frequency. Groundwater systems shall take one sample at each sampling point once every three years. Surface water systems (or combined surface/groundwater systems) shall take one sample annually at each sampling point.

2. IOC sampling waiver. The public water supply system may apply for a waiver from the monitoring frequencies specified in 41.3(1)“c”(4)“1.”

3. IOC sampling during a waiver. A condition of the waiver shall require that a public water supply system shall take a minimum of one sample while the waiver is effective. The term during which the waiver is effective shall not exceed one compliance cycle (i.e., nine years).

4. Bases of an IOC waiver and grandfathered data. The department may grant a waiver provided surface water systems have monitored annually for at least three years and groundwater systems have conducted a minimum of three rounds of monitoring. (At least one sample shall have been taken since January 1, 1990.) Both surface and groundwater systems shall demonstrate that all previous analytical results were less than the maximum contaminant level. Systems that use a new water source are not eligible for a waiver until three rounds of monitoring from the new source have been completed.

5. Bases of the IOC sampling frequency during a waiver. In determining the appropriate reduced monitoring frequency, the department will consider: reported concentrations from all previous monitoring; the degree of variation in reported concentrations; and other factors which may affect contaminant concentrations such as changes in groundwater pumping rates, changes in the system's configuration, changes in the system's operating procedures, or changes in stream flows or characteristics.

6. Effect of an IOC waiver. A decision to grant a waiver shall be made in writing and shall include the basis for the determination. The determination may be initiated by the department or upon an application by the public water supply system. The public water supply system shall specify the basis for its request. The department may review and, where appropriate, revise its determination of the appropriate monitoring frequency when the system submits new monitoring data or when other data relevant to the system's appropriate monitoring frequency become available.

7. Exceedance of an IOC MCL. Public water supply systems which exceed the maximum contaminant levels as calculated in 41.3(1)“b” shall monitor quarterly beginning in the next quarter after the violation occurred.

8. IOCs reliably and consistently below the MCL. The department may decrease the quarterly monitoring requirement to the frequencies specified in 41.3(1)“c”(4)“1” and “2” provided it has determined that the public water supply system is reliably and consistently below the maximum contaminant level. In no case can the department make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.

(5) Routine and repeat monitoring frequency for nitrates. All public water supply systems (community; nontransient noncommunity; and transient noncommunity systems) shall monitor to determine compliance with the maximum contaminant level for nitrate in 41.3(1)“b.”

1. Initial nitrate sampling. Community and nontransient noncommunity water systems served by groundwater systems shall monitor annually beginning January 1, 1993; systems served by surface water shall monitor quarterly beginning January 1, 1993.

2. Groundwater repeat nitrate sampling frequency. For community and nontransient noncommunity water systems, the repeat monitoring frequency for groundwater systems shall be quarterly for at least one year following any one sample in which the concentration is greater than or equal to 5.0 mg/l as N. The department may allow a groundwater system to reduce the sampling frequency to annually after four consecutive quarterly samples are reliably and consistently less than 5.0 mg/l as N.

3. Surface water repeat nitrate sampling frequency. For community and nontransient noncommunity water systems, the department may allow a surface water system to reduce the sampling frequency to annually if all analytical results from four consecutive quarters are less than 5.0 mg/l as N. A surface water system shall return to quarterly monitoring if any one sample is greater than 5.0 mg/l as N.

4. Transient noncommunity water systems shall monitor annually beginning January 1, 1993.

5. Scheduling annual nitrate repeat samples. After the initial round of quarterly sampling is completed, each community and nontransient noncommunity system which is monitoring annually shall take subsequent samples during the quarter(s) which previously resulted in the highest analytical result.

(6) Routine and repeat monitoring frequency for nitrite. All public water supply systems (community; nontransient noncommunity; and transient noncommunity systems) shall monitor to determine compliance with the maximum contaminant level for nitrite in 41.3(1)“b.”

1. Initial nitrite sampling. All public water systems shall take one sample at each sampling point in the compliance period beginning January 1, 1993, and ending December 31, 1995.

2. Nitrite repeat monitoring. After the initial sample, systems where an analytical result for nitrite is less than 0.5 mg/l as N shall monitor at the frequency specified by the department.

3. Nitrite increased monitoring. For community, nontransient noncommunity, and transient noncommunity water systems, the repeat monitoring frequency for any water system shall be quarterly for at least one year following any one sample in which the concentration is greater than or equal to 0.5 mg/l as N. The department may allow a system to reduce the sampling frequency to annually after determining the system is reliably and consistently less than the MCL.

4. Scheduling of annual nitrite repeat samples. Systems which are monitoring annually shall take each subsequent sample during the quarter(s) which previously resulted in the highest analytical result.

(7) Confirmation sampling.

1. Deadline for IOCs confirmation samples. Where the results of an analysis for asbestos, barium, cadmium, chromium, fluoride, mercury, or selenium indicate an exceedance of the maximum contaminant level, the department may require that one additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two weeks) at the same sampling point.

2. Deadline for nitrate and nitrite confirmation samples. Where nitrate or nitrite sampling results indicate an exceedance of the maximum contaminant level, the system shall take a confirmation sample within 24 hours of the system's receipt of notification of the analytical results of the first sample. Public water supply systems unable to comply with the 24-hour sampling requirement must immediately notify the consumers served by the area served by the public water system in accordance with 41.10(2) and complete an analysis of a confirmation sample within two weeks of notification of the analytical results of the first sample.

3. Compliance calculations and confirmation samples. If a required confirmation sample as collected within the time specified in 41.3(1)“c”(7)“1” is taken for any contaminant, then the results of the initial and confirmation sample shall be averaged. The resulting average shall be used to determine the system's compliance in accordance with 41.3(1)“b.” The department has the discretion to delete results of obvious sampling errors.

(8) Designation of increased sampling frequency. The department may require more frequent monitoring than specified in 41.3(1)“c”(3) through (6) or may require confirmation samples for positive and negative results at its discretion. Public water supply systems may apply to conduct more frequent monitoring than the minimum monitoring frequencies specified in this subrule. Any increase or decrease in monitoring under this subparagraph will be designated in an operation permit or administrative order. To increase or decrease such frequency, the department shall consider the following factors:

1. Reported concentrations from previously required monitoring,
2. The degree of variation in reported concentrations,
3. Blending or treatment processes conducted for the purpose of complying with the MCL, and
4. Other factors include changes in pumping rates in groundwater supplies or significant changes in the system's configuration, operating procedures, source of water and changes in streamflows.

(9) Grandfathered data. For the initial analysis required by 41.3(1)“c,” data for surface waters acquired within one year prior to the effective date and data for groundwaters acquired within three years prior to the effective date of 41.3(1)“c” may be substituted at the discretion of the department.

d. *Best available treatment technologies (BATs) for IOCs.* The department identifies the following as the best technology, treatment technique, or other means available for achieving compliance with the maximum contaminant levels for inorganic contaminants identified in 41.3(1)“b,” except fluoride and arsenic:

BAT for inorganic compounds listed in 41.3(1)“b”(1)

<u>Chemical Name</u>	<u>BAT(s)</u>
Antimony	2,7
Asbestos	2,3,8
Barium	5,6,7,9
Beryllium	1,2,5,6,7
Cadmium	2,5,6,7
Chromium	2,5,6 ^b ,7
Cyanide	5,7,10
Mercury	2 ^a ,4,6 ^a ,7 ^a
Nickel	5,6,7
Nitrate	5,7,9
Nitrite	5,7
Selenium	1,2 ^c ,6,7,9
Thallium	1,5

^aBAT only if influent Hg concentrations are less than 10 micograms/liter.^bBAT for Chromium III only.^cBAT for Selenium IV only.

Key to BATs in Table

- 1 = Activated Alumina
- 2 = Coagulation/Filtration
- 3 = Direct and Diatomite Filtration
- 4 = Granular Activated Carbon
- 5 = Ion Exchange
- 6 = Lime Softening
- 7 = Reverse Osmosis
- 8 = Corrosion Control
- 9 = Electrodialysis
- 10 = Chlorine
- 11 = Ultraviolet

e. Analytical methodology.

(1) Analytical methods for IOCs. Analysis for the listed inorganic contaminants shall be conducted using the following methods:

INORGANIC CONTAMINANTS ANALYTICAL METHODS

<u>Contaminant</u>	<u>Methodology</u>	<u>EPA</u> ^{1, 5, 12}	<u>ASTM</u> ²	<u>SM</u> ³	<u>USGS</u> ⁴	<u>Other</u>
Antimony	Atomic absorption; furnace ⁶	204.2 ¹		3113		
	Atomic absorption; platform ⁶	220.9 ⁵				
	ICP—Mass Spectrometry ⁶	200.8 ⁵				
	Hydride—Atomic absorption ⁹		D-3697-87			

Asbestos	Transmission Electron Microscopy	EPA ¹²			
Barium	Atomic absorption; furnace ⁶	208.2 ¹		3113B	
	Atomic absorption; direct ⁶	208.1 ¹		3111D	
	Inductively coupled plasma ⁶	200.7 ⁵		3120	
Beryllium	Atomic absorption; furnace ⁶	210.2 ¹	D-3645-84B	3113	
	Atomic absorption; platform ⁶	200.9 ⁵			
	Inductively coupled plasma ⁶	200.7 ⁵		3120	
	ICP—Mass Spectrometry ⁶	200.8 ⁵			
Cadmium	Atomic absorption; furnace ⁶	213.2 ¹		3113B	
	Inductively coupled plasma ⁶	200.7 ⁵			
Chromium	Atomic absorption; furnace ⁶	218.2 ¹		3113B	
	Inductively coupled plasma ⁶	200.7 ⁵		3120	
Cyanide	Distillation, Spec.	335.2 ¹	D-2036-89A	4500-CN-D	I330085
	Distillation, Automated, Spec.	335.3 ¹		4500-CN-E	
	Distillation, Selective Electrode		D-2036-89A	4500-CN-F	
	Distillation, Amenable, Spec.	335.1 ¹	D-2036-89B	4500-CN-G	
Mercury	Manual cold vapor technique ⁹	245.1 ¹	D3223-86	3112B	
	Automated cold vapor technique ⁹	245.2 ¹			
Nickel	Atomic absorption; furnace ⁶	249.2 ¹		3113	
	Atomic absorption; platform ⁶	200.9 ⁵			
	Atomic absorption; direct ⁶	249.1 ¹		3111B	
	Inductively coupled plasma ⁶	200.7 ⁵		3120	
	ICP—Mass Spectrometry ⁶	200.8 ⁵			
Nitrate	Manual cadmium reduction	353.3 ¹	D3867-90	4500-NO ₃ -E	
	Automated hydrazine reduction	353.1 ¹			
	Automated cadmium reduction	353.2 ¹	D3867-90	4500-NO ₃ -F	

	Ion selective electrode				WeWWG/5880 ⁷
	Ion chromatography	300.0 ¹¹			B-1011 ⁸
Nitrite	Spectrophotometric	354.1 ¹			
	Automated cadmium reduction	353.2 ¹	D3867-90	4500-NO ₃ -F	
	Manual cadmium reduction	353.3 ¹	D3867-90	4500-NO ₃ -E	
	Ion Chromatography	300.0 ¹¹			B-1011 ⁸
Selenium	Hydride—Atomic absorption ⁹		D3859-84A	3114B	
	Atomic absorption; furnaces ^{6, 10}	270.2 ¹	D3859-88	3113B	
Thallium	Atomic absorption; furnace ⁶	279.2 ¹		3113	
	Atomic absorption; platform ⁶	200.9 ⁵			
	ICP—Mass Spectrometry ⁶	200.8 ⁵			

¹ "Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring Systems Laboratory, Cincinnati, OH 45268 (EPA-600/4-79-020), March 1983.

² Annual Book of ASTM Standards, Vols. 11.01 and 11.02, 1991, American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

³ "Standard Methods for the Examination of Water and Wastewater," 17th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1989.

⁴ "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments," Techniques of Water Resources Investigations of the U.S. Geological Survey, Book 5, Chapter A-1, Third Edition, 1989. Available at Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

⁵ "Methods for the Determination of Metals in Environmental Samples." Available at NTIS, PB 91-231498.

⁶ Samples that contain less than 1.0 NTU (nephelometric turbidity unit) and are properly preserved (conc. HNO₃ to pH less than 2) may be analyzed directly (without digestion) for total metals, otherwise digestion is required. Turbidity must be measured on the preserved samples just prior to the initiation of metal analysis. When digestion is required, the total recoverable technique as defined in the method must be used.

⁷ "Orion Guide to Water and Wastewater Analysis." Form WeWWG/5880, pp.5, 1985. Orion Research, Inc., Cambridge, MA.

⁸ "Waters Test Method for the Determination of Nitrite/Nitrate in Water Using Single Column Ion Chromatography, Method B-1011, Millipore Corporation, Waters Chromatography Division, 34 Maple Street, Milford, MA 01757.

⁹ For the gaseous hydride determinations of antimony and selenium and for the determination of mercury by the cold vapor techniques, the proper digestion technique as defined in the method must be followed to ensure the element is in the proper state for analyses.

¹⁰ Add 2 ml of 30% H₂O₂ and an appropriate concentration of matrix modifier Ni(NO₃)₂·6H₂O (nickel nitrate) to samples.

¹¹ "Method 300. Determination of Inorganic Anions in Water by Ion Chromatography." Inorganic Chemistry Branch, Environmental Monitoring Systems Laboratory, August 1991.

¹² "Analytical Method for Determination of Asbestos Fibers in Water," EPA-600/4-83-043, September 1983, U.S. EPA, Environmental Research Laboratory, Athens, GA 30613.

(2) Analytical methods for arsenic. Analyses for arsenic shall be conducted using the following methods: Method 206.2¹, Atomic Absorption Furnace Technique; or Method 206.3¹, or Method D2972-78B⁴, or Method 301 A VII, pp. 159-162, or Method I-1062-78, pp. 61-63³, Atomic Absorption—Gaseous Hydride; or Method 206.4¹, or Method D-2972-88A⁴, or Method 307B², Spectrophotometric, Silver Diethyl-dithiocarbamate; or Method 200.7A, Inductively-Coupled Plasma Technique⁵.

¹ - "Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268 (EPA-600/4-79-020), March 1979. Available from ORD Publications, CERL, EPA, Cincinnati, OH 45268. For approved analytical procedures for metals, the technique applicable to total metals must be used.

² - "Standard Methods for the Examination of Water and Wastewater," 16th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1985.

³ - Techniques of Water-Resources Investigation of the United States Geological Survey, Chapter A-1, "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments," Book 5, 1979, Stock #014-001-03177-9. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

⁴ - Annual Book of ASTM Standards, part 31 Water, American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

⁵ - Appendix to Method 200.7, March 1987, U.S. EPA, Environmental Monitoring Systems Laboratory, Cincinnati, OH 45268.

(3) Analytical methods for fluoride. Analyses for fluoride shall be conducted using the following methods:

FLUORIDE ANALYTICAL METHODS
Reference (Method Number)¹

<u>Methodology</u>	<u>EPA</u> ¹	<u>ASTM</u> ⁴	<u>SM</u> ⁵	<u>Other</u>
Colorimetric SPADNS, with distillation	340.1	D1179-72A	43 A and C	
Potentiometric ion selective electrode	340.2	D1179-72B	413B	
Automated Alizarin fluoride blue, with distillation (complexone)	340.3		413E	129-71W ⁶
Automated ion selective electrode				380-75WE ⁷

¹ - "Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268 (EPA-600/4-79-020), March 1983. Available from ORD Publications, CERL, EPA, Cincinnati, OH 45268. For approved analytical procedures for metals, the technique applicable to total metals must be used.

² [Reserved]

³ [Reserved]

⁴ - Annual Book of ASTM Standards, part 31 Water, American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

⁵ - "Standard Methods for the Examination of Water and Wastewater," 16th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1985.

⁶ - "Fluoride in Water and Wastewater, Industrial Method = 129-71 W." Technicon Industrial Systems, Tarrytown, NY 10591. December 1972.

⁷ - "Fluoride in Water and Wastewater," Technicon Industrial Systems, Tarrytown, NY 10591. February 1976.

(4) Sampling methods for other IOC's. Sample collection for antimony, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, selenium, and thallium under this subparagraph shall be conducted using the sample preservation, container, and maximum holding time procedures specified in the table below:

SAMPLING METHODS FOR OTHER IOC's

<u>Contaminant</u>	<u>Preservative</u> ¹	<u>Container</u> ²	<u>Time</u> ³
Antimony	Conc HNO ₃ to pH less than 2	P or G	6 months
Asbestos	Cool, 4 deg C	P or G	
Barium	Conc HNO ₃ to pH less than 2	P or G	6 months
Beryllium	Conc HNO ₃ to pH less than 2	P or G	6 months
Cadmium	Conc HNO ₃ to pH less than 2	P or G	6 months
Chromium	Conc HNO ₃ to pH less than 2	P or G	6 months
Cyanide	Cool, 4 deg C, Sodium Hydroxide (NAOH) to pH greater than 12 ⁴	P or G	14 days
Fluoride	None	P or G	1 month
Mercury	Conc HNO ₃ to pH less than 2	P or G	28 days
Nickel	Conc HNO ₃ to pH less than 2	P or G	6 months
Nitrate			
Chlorinated	Cool, 4 deg C	P or G	28 days
Nonchlorinated	Conc H ₂ SO ₄ to pH less than 2	P or G	14 days
Nitrite	Cool, 4 deg C	P or G	48 hours
Selenium	Conc HNO ₃ to pH less than 2	P or G	6 months
Thallium	Conc HNO ₃ to pH less than 2	P or G	6 months

¹ If HNO₃ cannot be used because of shipping restrictions, sample may be initially preserved by icing and immediately shipping it to the laboratory. Upon receipt in the laboratory, the sample must be acidified with conc. HNO₃ to pH less than 2 and held for 16 hours before analysis.

² P = plastic, hard or soft; G = glass, hard or soft.

³ In all cases, samples should be analyzed as soon after collection as possible.

⁴ See method(s) for the information for preservation.

f. *Unregulated inorganic chemicals.*

Analytical Methods for Unregulated Inorganic Contaminants:

<u>Contaminant</u>	<u>EPA Analytical Method</u>
Antimony	Graphite Furnace Atomic Absorption; Inductively Coupled Plasma
Beryllium	Graphite Furnace Atomic Absorption; Inductively Coupled Mass Spectrometry Plasma; Spectrophotometric
Nickel	Atomic Absorption; Inductively Coupled Plasma; Graphite Furnace Atomic Absorption
Sulfate	Colorimetric
Thallium	Graphite Furnace Atomic Absorption; Inductively Coupled Mass Spectrometry Plasma
Cyanide	Spectrophotometric

41.3(2) Other inorganic chemical contaminants. Reserved.**567—41.4(455B) Lead, copper, and corrosivity.**

41.4(1) Lead, copper, and corrosivity regulation by the setting of a treatment technique requirement. The lead and copper rules do not set an MCL, although this could be changed in the future. The rules set two enforceable action levels, which trigger tap monitoring, corrosion control, source water treatment, lead service line replacement, and public education if exceeded.

a. Applicability. Unless otherwise indicated, each of the provisions of this subrule applies to community water systems and nontransient noncommunity water systems (hereinafter referred to as “water systems” or “systems”).

b. Action levels.

(1) The lead action level is exceeded if the concentration of lead in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with 41.4(1) “c” is greater than 0.015 mg/l (i.e., if the “90th percentile” lead level is greater than 0.015 mg/l).

(2) The copper action level is exceeded if the concentration of copper in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with 41.4(1) “c” is greater than 1.3 mg/l (i.e., if the “90th percentile” copper level is greater than 1.3 mg/l).

(3) The 90th percentile lead and copper levels shall be computed as follows:

The results of all lead or copper samples taken during a monitoring period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sampling result shall be assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.

The number of samples taken during the monitoring period shall be multiplied by 0.9.

The contaminant concentration in the numbered sample yielded by the calculation in 41.4(1) “b”(3), second unnumbered paragraph, is the 90th percentile contaminant level.

For water systems serving fewer than 100 people that collect five samples per monitoring period, the 90th percentile is computed by taking the average of the highest and second highest concentrations.

c. Lead and copper tap water monitoring requirements.

(1) Sample site selection.

1. General. Public water supply systems shall complete a materials evaluation of their distribution systems by the date indicated in 41.4(1) “c”(4) in order to identify a pool of sampling sites that meets the requirements of this subrule, and which is sufficiently large to ensure that the water system can collect the number of lead and copper tap samples required in 41.4(1) “c”(3). All sites from which first-draw samples are collected shall be selected from this pool of targeted sampling sites. Sampling sites may not include faucets that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants.

2. Information sources. A public water supply system shall use the information on lead, copper and galvanized steel that it is required to collect under 41.4(1)“f” as part of its responsibility for the special monitoring for corrosivity characteristics when conducting a materials evaluation. When an evaluation of the information collected is insufficient to locate the requisite number of lead and copper sampling sites that meet the targeting criteria in 41.4(1)“c”(1), the water system shall review all plumbing codes, permits, and records in the files of the building department(s) which indicate the plumbing materials that are installed within publicly and privately owned structures connected to the distribution system; all inspections and records of the distribution system that indicate the material composition of the service connections that connect a structure to the distribution system; and all existing water quality information, which includes the results of all prior analyses of the system or individual structures connected to the system, indicating locations that may be particularly susceptible to high lead or copper concentrations. In addition, the system shall seek to collect such information where possible in the course of its normal operations (e.g., checking service line materials when reading water meters or performing maintenance activities).

3. Tier 1 community sampling sites. The sampling sites selected for a community water system’s sampling pool (“tier 1 sampling sites”) shall consist of single-family structures that contain copper pipes with lead solder installed after 1982 or contain lead pipes; or are served by a lead service line. When multiple-family residences comprise at least 20 percent of the structures served by a water system, the system may include these types of structures in its sampling pool.

4. Tier 2 community sampling sites. Any community water system with insufficient tier 1 sampling sites shall complete its sampling pool with “tier 2 sampling sites,” consisting of buildings, including multiple-family residences that contain copper pipes with lead solder installed after 1982 or contain lead pipes; or are served by a lead service line.

5. Tier 3 community sampling sites. Any community water system with insufficient tier 1 and tier 2 sampling sites shall complete its sampling pool with “tier 3 sampling sites,” consisting of single-family structures that contain copper pipes with lead solder installed before 1983.

6. Tier 1 NTNC sampling sites. The sampling sites selected for a nontransient noncommunity water system (“tier 1 sampling sites”) shall consist of buildings that: contain copper pipes with lead solder installed after 1982 or contain lead pipes; or are served by a lead service line.

7. Other NTNC sampling sites. A nontransient noncommunity water system with insufficient tier 1 sites that meet the targeting criteria in 41.4(1)“c”(1)“6” shall complete its sampling pool with sampling sites that contain copper pipes with lead solder installed before 1983.

8. Reporting of sample site selection criteria. Any public water supply system whose sampling pool does not consist exclusively of tier 1 sites shall demonstrate in a letter submitted to the department why a review of the information listed in 41.4(1)“c”(1)“2” was inadequate to locate a sufficient number of tier 1 sites. Any community water system which includes tier 3 sampling sites in its sampling pool shall demonstrate in such a letter why it was unable to locate a sufficient number of tier 1 and tier 2 sampling sites. Any public water supply system whose distribution system contains lead service lines shall draw 50 percent of the samples it collects during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and 50 percent of those samples from sites served by a lead service line. A water system that cannot identify a sufficient number of sampling sites served by a lead service line shall demonstrate in a letter to the department why the system was unable to locate a sufficient number of such sites. Such a water system shall collect first-draw samples from all of the sites identified as being served by such lines.

(2) Sample collection methods.

1. Tap samples for lead and copper collected in accordance with this subparagraph, with the exception of lead service line samples collected under 567—subrule 43.8(4), shall be first-draw samples.

2. First-draw tap samples for lead and copper shall be one liter in volume and have stood motionless in the plumbing system of each sampling site for at least six hours. First-draw samples from residential housing shall be collected from the cold-water kitchen tap or bathroom sink tap. First-draw samples from a nonresidential building shall be collected at an interior tap from which water is typically drawn for consumption. First-draw samples may be collected by the system or the system may allow

residents to collect first-draw samples after instructing the residents of the sampling procedures specified in this paragraph. To avoid problems of residents handling nitric acid, acidification of first-draw samples may be done up to 14 days after the sample is collected. If the sample is not acidified immediately after collection, then the sample must stand in the original container for at least 28 hours after acidification. If a system allows residents to perform sampling, the system may not challenge, based on alleged errors in sample collection, the accuracy of sampling results.

3. Service line samples collected to determine if the service line is directly contributing lead (as described in 567—subrule 43.8(4)) shall be one liter in volume and have stood motionless in the lead service line for at least six hours and be collected at the tap after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based on the interior diameter and length of the pipe between the tap and the lead service line; tapping directly into the lead service line; or if the sampling site is a building constructed as a single-family residence, allowing the water to run until there is a significant change in temperature which would be indicative of water that has been standing in the lead service line.

4. A public water supply system shall collect each first-draw tap sample from the same sampling site from which it collected a previous sample. If, for any reason, the water system cannot gain entry to a sampling site in order to collect a follow-up tap sample, the system may collect the follow-up tap sample from another sampling site in its sampling pool as long as the new site meets the same targeting criteria, and is within reasonable proximity of the original site.

(3) Number of samples.

Water systems shall collect at least one sample during each monitoring period specified in 41.4(1)“c”(4) from the number of sites as listed in the column below titled “standard monitoring.” A system conducting reduced monitoring under 41.4(1)“c”(4) may collect one sample from the number of sites specified in the column titled “reduced monitoring” during each monitoring period specified in 41.4(1)“c”(5).

Required Number of Lead/Copper Samples

System Size (Number People Served)	Standard Monitoring (Number of Sites)	Reduced Monitoring (Number of Sites)
greater than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
less than or equal to 100	5	5

(4) Timing of monitoring.

1. Initial tap sampling. The first six-month monitoring period for small, medium-size and large systems shall begin on the following dates:

System Size (Number of People Served)	First Six-month Monitoring Period Begins on
greater than 50,000 (large system)	January 1, 1992
3,301 to 50,000 (medium system)	July 1, 1992
less than or equal to 3,300 (small system)	July 1, 1993

All large systems shall monitor during two consecutive six-month periods. All small and medium-size systems shall monitor during each six-month monitoring period until the system exceeds the lead or copper action level and is, therefore, required to implement the corrosion control treatment requirements under 567—paragraph 43.8(1)“a,” in which case the system shall continue monitoring in accordance with 41.4(1)“c”(4), or the system meets the lead and copper action levels during two consecutive six-month monitoring periods, in which case the system may reduce monitoring in accordance with 41.4(1)“c”(4).

2. Monitoring after installation of corrosion control and source water treatment. Large systems which install optimal corrosion control treatment pursuant to 567—subparagraph 43.8(1)“d”(4) shall monitor during two consecutive six-month monitoring periods by the date specified in 567—subparagraph 43.8(1)“d”(5). Small or medium-size systems which install optimal corrosion control treatment pursuant to 567—subparagraph 43.8(1)“e”(5) shall monitor during two consecutive six-month monitoring periods as specified in 567—subparagraph 43.8(1)“e”(6). Systems which install source water treatment shall monitor during two consecutive six-month monitoring periods by the date specified in 567—subparagraph 43.8(3)“a”(4).

3. Monitoring after the department specifies water quality parameter values for optimal corrosion control. After the department specifies the values for water quality control parameters under 567—paragraph 43.8(2)“f,” the system shall monitor during each subsequent six-month monitoring period, with the first monitoring period to begin on the date the department specifies the optimal values under 567—paragraph 43.8(2)“f.”

4. Reduced monitoring.

- A small or medium-size water system that meets the lead and copper action levels during each of two consecutive six-month monitoring periods may reduce the number of samples according to 41.4(1)“c”(3) and reduce the frequency of sampling to once per year.

- Any public water supply system that maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the department under 567—paragraph 43.8(2)“f” during each of two consecutive six-month monitoring periods may request that the system be allowed to reduce the monitoring frequency to once per year and to reduce the number of lead and copper samples according to 41.4(1)“c”(3). The department will review the information submitted by the water system and shall set forth the basis for its determination in writing. Where appropriate, the department will revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

- A small or medium-size water system that meets the lead and copper action levels during three consecutive years of monitoring may reduce the frequency of monitoring for lead and copper from annually to once every three years. Any water system that maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the department under 567—paragraph 43.8(2)“f” during three consecutive years of monitoring may request the department to allow the system to reduce the frequency of monitoring from annually to once every three years. The department shall review the information submitted by the system and shall set forth the basis for its determination in writing. Where appropriate, the department will revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

- A water system that reduces the number and frequency of sampling shall collect these samples from sites included in the pool of targeted sampling sites identified in 41.4(1)“c”(1). Systems sampling annually or less frequently shall conduct the lead and copper tap sampling during the months of June, July, August or September.

- A small or medium-size water system subject to reduced monitoring that exceeds the lead or copper action level shall resume sampling according to 41.4(1)“c”(4)“3” and collect the number of samples specified for standard monitoring in 41.4(1)“c”(4). Such systems shall also conduct water quality parameter monitoring in accordance with 41.4(1)“d”(2), (3), or (4), as appropriate, during the monitoring period in which it exceeded the action level. Any water system subject to reduced monitoring

frequency that fails to operate within the range of values for the water quality control parameters specified by the department under 567—paragraph 43.8(2)“f” shall resume tap water sampling according to 41.4(1)“c”(4)“3” and collect the number of samples specified for standard monitoring in 41.4(1)“c”(3).

- Additional monitoring by systems. The results of any monitoring conducted in addition to the minimum requirements of 41.4(1)“c” shall be considered by the system and the department in making any determinations (i.e., calculating the 90th percentile lead or copper level) under this subrule.

d. Water quality parameter monitoring requirements. All large public water supply systems (and all small and medium-size public water supply systems that exceed the lead or copper action level) shall monitor water quality parameters in addition to lead and copper in accordance with this subrule. The requirements of this subrule are summarized in the table at the end of 41.4(1)“d”(6).

(1) General requirements.

1. Sample collection methods. Tap samples shall be representative of water quality throughout the distribution system taking into account the number of persons served, the different sources of water, the different treatment methods employed by the system, and seasonal variability. Tap sampling under this subrule is not required to be conducted at taps targeted for lead and copper sampling under 41.4(1)“c”(1)“1.” Systems may conduct tap sampling for water quality parameters at sites used for coliform sampling. Samples collected at the entry point(s) to the distribution system shall be from locations representative of each source after treatment. If a system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

2. Number of samples. Systems shall collect two samples for each applicable water quality parameter at each entry point to the distribution system during each monitoring period specified in 41.4(1)“d”(2). During each monitoring period specified in 41.4(1)“d”(3) through (5), systems shall collect one sample for each applicable water quality parameter at each entry point to the distribution system. Systems shall collect two tap samples for applicable water quality parameters during each monitoring period specified in 41.4(1)“d”(2) through (5) from the following number of sites.

Required Number of Samples: Water Quality Parameters

System Size (Number People Served)	Number of Sites for Water Quality Parameters
greater than 100,000	25
10,001 to 100,000	10
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
less than or equal to 100	1

(2) Initial sampling. Large water systems shall measure the applicable water quality parameters as specified below at taps and at each entry point to the distribution system during each six-month monitoring period specified in 41.4(1)“c”(4)“1.” Small and medium-size systems shall measure the applicable water quality parameters at taps and at each entry point to the distribution system during each six-month monitoring period specified in 41.4(1)“c”(4)“1” during which the system exceeds the lead or copper action level. Tap water and entry point monitoring shall include: pH; alkalinity; orthophosphate, when an inhibitor containing a phosphate compound is used; silica, when an inhibitor containing a silicate compound is used; calcium; conductivity; and water temperature.

(3) Monitoring after installation of corrosion control. Large systems which install optimal corrosion control treatment pursuant to 567—subparagraph 43.8(1)“d”(4) shall measure the water quality parameters at the locations and frequencies specified below during each six-month monitoring period specified in 41.4(1)“c”(4)“2.” Small or medium-size systems which install optimal corrosion control

treatment shall conduct such monitoring during each six-month monitoring period specified in 41.4(1)“c”(4)“2” in which the system exceeds the lead or copper action level.

1. Tap water monitoring shall include two samples for: pH; alkalinity; orthophosphate, when an inhibitor containing a phosphate compound is used; silica, when an inhibitor containing a silicate compound is used; calcium, when calcium carbonate stabilization is used as part of corrosion control.

2. Monitoring at each entry point to the distribution system shall include one sample every two weeks (biweekly) for: pH; a reading of the dosage rate of the chemical used to adjust alkalinity, and the alkalinity concentration when alkalinity is adjusted as part of optimal corrosion control; and a reading of the dosage rate of the inhibitor used, and the concentration of orthophosphate or silica (whichever is applicable) when a corrosion inhibitor is used as part of optimal corrosion control.

(4) Monitoring after the department specifies water quality parameter values for optimal corrosion control. After the department specifies the values for applicable water quality control parameters reflecting optimal corrosion control treatment, large systems shall measure the applicable water quality parameters according to 41.4(1)“d”(3) during each monitoring period specified in 41.4(1)“c”(4)“3.” Any small or medium-size system shall conduct such monitoring during each monitoring period specified in 41.4(1)“c”(4)“3” in which the system exceeds the lead or copper action level. The system may take a confirmation sample for any water quality parameter value no later than three days after the first sample. If a confirmation sample is taken, the result must be averaged with the first sampling result and the average must be used for any compliance determinations. The department may delete results of obvious sampling errors from this calculation.

(5) Reduced monitoring.

1. Public water supply systems that maintain the range of values for the water quality parameters reflecting optimal corrosion control treatment during each of two consecutive six-month monitoring periods under 41.4(1)“c”(4) shall continue monitoring at the entry point(s) to the distribution system as specified in 567—paragraph 43.8(2)“f.” Such system may collect two tap samples for applicable water quality parameters from the following reduced number of sites during each six-month monitoring period.

Reduced Water Quality Parameter Monitoring

System Size (Number People Served)	Reduced Number of Sites for Water Quality Parameters
greater than 100,000	10
10,001 to 100,000	7
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
less than or equal to 100	1

2. Public water systems that maintain the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the department under 567—paragraph 43.8(2)“f” during three consecutive years of annual monitoring under this paragraph may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in 41.4(1)“d”(5) from annually to every three years.

3. A public water system that conducts sampling annually shall collect these samples evenly throughout the year so as to reflect seasonal variability.

4. Public water systems subject to reduced monitoring frequency that fail to operate within the range of values for the water quality parameters specified by the department under 567—paragraph 43.8(2)“f” shall resume tap water sampling in accordance with the number and frequency requirements in 41.4(1)“d”(3).

(6) Additional monitoring by systems. The results of any monitoring conducted in addition to the minimum requirements of this subrule shall be considered in making any determinations (i.e., determining concentrations of water quality parameters) under this subrule or 567—subrule 43.8(2).

SUMMARY OF MONITORING REQUIREMENTS FOR WATER QUALITY PARAMETERS¹

<u>Monitoring Period</u>	<u>Parameters²</u>	<u>Location</u>	<u>Frequency</u>
Initial Monitoring	pH, alkalinity, orthophosphate or silica ³ , calcium, conductivity, temperature	Taps and at entry point(s) to distribution systems	Every 6 months
After Installation of Corrosion Control	pH, alkalinity, orthophosphate, silica ³ , calcium ⁴	Taps	Every 6 months
—	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual ⁵	Entry point(s) to distribution system	Biweekly
After State Specifies Parameter Values for Optimal Corrosion Control	pH, alkalinity, orthophosphate, silica ³ , calcium ⁴	Taps	Every 6 months
—	pH, alkalinity, dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual ⁵	Entry point(s) to distribution system	Biweekly
Reduced Monitoring	pH, alkalinity, orthophosphate or silica ³ , calcium ⁴	Taps	Every 6 months at a reduced number of sites
—	pH, alkalinity rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual ⁵	Entry point(s) to distribution system	Biweekly

¹ Table is for illustrative purposes; consult the text of this subrule for precise regulatory requirements.

² Small and medium-size systems have to monitor for water quality parameters only during monitoring periods in which the system exceeds the lead or copper action level.

³ Orthophosphate must be measured only when an inhibitor containing a phosphate compound is used. Silica must be measured only when an inhibitor containing silicate compound is used.

⁴ Calcium must be measured only when calcium carbonate stabilization is used as part of corrosion control.

⁵ Inhibitor dosage rates and inhibitor residual concentrations (orthophosphate or silica) must be measured only when an inhibitor is used.

e. Lead and copper source water monitoring requirements.

(1) Sample location, collection methods, and number of samples.

1. A water system that fails to meet the lead or copper action level on the basis of tap samples collected in accordance with 41.4(1)“c” shall collect lead and copper source water samples in accordance with the requirements regarding sample location, number of samples, and collection methods specified for inorganic chemical sampling. The timing of sampling for lead and copper shall be in accordance with 41.4(1)“e”(2) and (3).

2. Where the results of sampling indicate an exceedance of maximum permissible source water levels established under 567—subparagraph 43.8(3)“b”(4), the department may require that one additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two

weeks) at the same sampling point. If a confirmation sample is taken for lead or copper, then the results of the initial and confirmation samples shall be averaged in determining compliance with the maximum permissible levels. Lead and copper analytical results below the detection limit shall be considered to be zero. Analytical results above the detection limit but below the practical quantification level (PQL) shall either be considered as the measured value or be considered one-half the PQL.

(2) Monitoring after system exceeds tap water action level. Any system which exceeds the lead or copper action level at the tap shall collect one source water sample from each entry point to the distribution system within six months after the exceedance.

(3) Monitoring after installation of source water treatment. Any system which installs source water treatment pursuant to 567—subparagraph 43.8(3) “a”(3) shall collect an additional source water sample from each entry point to the distribution system during two consecutive six-month monitoring periods by the deadline specified.

(4) Monitoring frequency after the department specifies maximum permissible source water levels or determines that source water treatment is not needed.

1. A system shall monitor at the frequency specified below in cases where the department specifies maximum permissible source water levels under 567—subparagraph 43.8(3) “b”(4) or determines that the system is not required to install source water treatment under 567—subparagraph 43.8(3) “b”(2). A water system using only groundwater shall collect samples once during the three-year compliance period in effect when the department makes this determination. Such systems shall collect samples once during each subsequent compliance period. A public water system using surface water (or a combination of surface and groundwater) shall collect samples once during each year, the first annual monitoring period to begin on the date on which the department makes this determination.

2. A system using only groundwater is not required to conduct source water sampling for lead or copper if the system meets the action level for the specific contaminant in tap water samples during the entire source water sampling.

(5) Reduced monitoring frequency.

1. A water system using only groundwater which demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead or copper concentrations specified by the department in 567—subparagraph 43.8(3) “b”(4) during at least three consecutive compliance periods under 41.4(1) “e”(4) “1” may reduce the monitoring frequency for lead or copper to once during each nine-year compliance cycle as defined in 567—40.2(455B).

2. A water system using surface water (or a combination of surface and groundwaters) which demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the department in 567—subparagraph 43.8(3) “b”(4) for at least three consecutive years may reduce the monitoring frequency in 41.4(1) “e”(4) “1” to once during each nine-year compliance cycle.

3. A water system that uses a new source of water is not eligible for reduced monitoring for lead or copper until concentrations in samples collected from the new source during three consecutive monitoring periods are below the maximum permissible lead and copper concentrations specified.

f. *Corrosivity monitoring protocol — special monitoring for corrosivity characteristics.* Suppliers of water for community public water systems shall collect samples from a representative entry point to the water distribution system for the purpose of analysis to determine the corrosivity characteristics of the water. The determination of corrosivity characteristics of water shall only include one round of sampling, except in cases where the department concludes additional monitoring is necessary due to variability of the raw water sources. Sampling requirements and approved analytical methods are as follows:

(1) Systems utilizing a surface water source either in whole or in part shall collect two samples per plant for the purpose of determining the corrosivity characteristics. One of these samples is to be collected during the midwinter months and the other during midsummer.

(2) Systems utilizing groundwater sources shall collect one sample per plant or source, except systems with multiple plants that do not alter the corrosivity characteristics identified in 41.4(1) "f"(3) or systems served by multiple wells drawing raw water from a single aquifer may, with departmental approval, be considered one treatment plant or source when determining the number of samples required.

(3) Determination of corrosivity characteristics of water shall include measurements of pH, calcium hardness, alkalinity, temperature, total dissolved solids (total filterable residue), and calculation of the Langelier Index. In addition, sulfate and chloride monitoring may be required by the department. At the department's discretion, the Aggressive Index test may be substituted for the Langelier Index test.

(4) The following analytical methods must be used by an approved laboratory, except for temperature which should be measured by the supplier using the approved method.

1. Langelier Index—"Standard Methods for the Examination of Water and Wastewater," Seventeenth Edition, American Public Health Association, 1015 15th Street N.W., Washington, D.C. 20005 (1989), Method 203, pp. 61-63.

2. Aggressive Index—"AWWA Standard for Asbestos-Cement Pipe, 4 in. through 24 in. for Water and Other Liquids," AWWA C400-75, Revision of C400-75, AWWA, Denver, Colorado.

3. Total Filterable Residue—"Standard Methods," Method 208B, pp. 92-93; or "Methods for Chemical Analysis of Water and Wastes," Method 160.1.

4. Temperature—"Standard Methods," Method 212, pp. 125-126.

5. Calcium—EDTA Titrimetric Method, "Standard Methods," Method 306C, pp. 189-191; or "Annual Book of ASTM Standards," Method D1126-67(8); "Methods for Chemical Analysis of Water and Waste," Method 215.2.

6. Alkalinity—Methyl Orange and paint pH 4.5. "Standard Methods," Method 403, pp. 278-281; or "Annual Book of ASTM Standards," Method D1067-70B; or "Methods for Chemical Analysis of Water and Wastes," Method 310.1.

7. pH—"Standard Methods," Method 424, pp. 460-85; or "Methods for Chemical Analysis of Water and Wastes," Method 150.1; or "Annual Book of ASTM Standards," Method D129378 A or B.

8. Chloride—Potentiometric Method, "Standard Methods," p. 306.

9. Sulfate—Turbidimetric Method, "Methods for Chemical Analysis of Water and Wastes," pp. 217-278, EPA, Office of Technology Transfer, Washington, D.C. 20460, 1974, or "Standard Methods," pp. 496-498.

(5) Distribution system construction materials. Community and nontransient noncommunity water supply systems shall identify whether the following construction materials are present in their distribution system and report to the department:

1. Lead from piping, solder, caulking, interior lining of distribution mains, alloys, and home plumbing.

2. Copper from piping and alloys, service lines, and home plumbing.

3. Galvanized piping, service lines, and home plumbing.

4. Ferrous piping materials such as cast iron and steel.

5. Asbestos cement pipe.

6. Vinyl lined asbestos cement pipe.

7. Coal tar lined pipes and tanks.

g. Lead, copper analytical methods.

(1) Analyses for lead, copper, pH, conductivity, calcium, alkalinity, orthophosphate, silica, and temperature shall be conducted using the following methods:

LEAD/COPPER and WATER QUALITY PARAMETER ANALYTICAL METHODS

Reference (Method Number)

Contaminant	Methodology ⁹	EPA ¹	ASTM ²	-SM ³	USGS ⁴
Lead	Atomic absorption; furnace technique	239.2	D3559-85D	3113	
	Inductively-coupled plasma; mass spectrometry	200.8 ⁶			
	Atomic absorption; platform furnace technique	200.9 ⁷			
Copper	Atomic absorption; furnace technique	220.2	D1688-90C	3113	
	Atomic absorption; direct aspiration	220.1	D1688-90A	3111-B	
	Inductively-coupled plasma	200.7 ⁵		3120	
	Inductively-coupled plasma; mass spectrometry	200.8 ⁶			
	Atomic absorption; platform furnace	200.9 ⁷			
pH	Electrometric	150.1	D1293-84B	4500-H+	
		150.2			
Conductivity	Conductance	120.1	D1125-82B	2510	
Calcium	EDTA titrimetric	215.2	D511-88A	3500-Ca-D	
	Atomic absorption; direct aspiration	215.1	D511-88B	3111-B	
	Inductively-coupled plasma	200.75		3120	
Alkalinity	Titrimetric	310.1	D1067-88B	2320	
	Electrometric titration				I-1030-85
Orthophosphate	Unfiltered no digestion or hydrolysis	365.1		4500-P-F	
	Colorimetric, ascorbic acid, two reagent	365.3		4500-P-F	
	Colorimetric, ascorbic acid, single reagent	365.2	D515-88A		
	Colorimetric, phosphomolybdate;				I-1601-85
	Automated-segmented flow				I-2601-85
	Automated discrete				I-2598-85
	Ion Chromatography	300.0 ⁸	D4327-88	4110	
Silica	Colorimetric, molybdate blue				I-1700-85
	Automated-segmented flow				I-2700-85
	Colorimetric	370.1	D859-88		
	Molybdosilicate			4500-Si-D	
	Heteropoly blue			4500-Si-E	
	Automated method for molybdate-reactive silica			4500-Si-F	
Temperature	Inductively-coupled plasma	200.75		3120	
	Thermometric			2550	

¹ The procedures 239.2, 220.2, 220.1, 150.1, 150.2, 120.1, 215.2, 215.1, 310.1, 365.1, 365.3, 365.2, and 370.1 are incorporated by reference and shall be done in accordance with "Methods for Chemical Analysis of Water and Wastes," EPA Environmental Monitoring and Support Laboratory, Cincinnati, OH (EPA-600/4-79-020), Revised March 1983, pp. 239.2-1 through 239.2-2 and metals-1 through metals-19, 220.2-1 through 220.2-2 and metals-1 through metals-19, 220.1-1 through 220.1-2 and metals-1 through metals-19, 150.1-1 through 150.1-3, 150.2-1 through 150.2-3, 120.1-1 through 120.1-3, 215.2-1 through 215.2-3, 215.1-1 through 215.1-2, 310.1-1 through 310.1-3, 365.1-1 through 365.1-9, 365.3-1 through 365.3-4, 365.2-1 through 365.2-6, and 370.1-1 through 370.1-5, respectively. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be obtained from ORD Publications, CERL, EPA, Cincinnati, OH 45268. Copies may be inspected at the United States Environmental Protection Agency, 401 M Street, SW, Room EB-15, Washington, D.C. 20460 or at the Office of the Federal Register, 1100 L Street, NW, Room 8401, Washington, D.C.

² The procedures D3559-85D, D1688-90C, D1688-90A, D1293-84B, D1125-82B, D511-88, D1067-88B, D515-88A, D4327-88, and D859-88 are incorporated by reference and shall be done in accordance with Annual Book of ASTM Standards, Vol. 11.01, American Society for Testing and Materials, 1990, 401-403, 352-353, 349-350, 212-214, 137-138, 309-312, 312-314, 123-124, 459-462, 260-265, and 479-481, respectively. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be obtained from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103. Copies may be inspected at the United States Environmental Protection Agency, 401 M Street, SW, Room EB-15, Washington, D.C. 20460 or at the Office of the Federal Register, 1100 L Street, NW, Room 8401, Washington, D.C.

³ The procedures 3113, 3111-B, 3120, 4500-H+, 2510, 3500-Ca-D, 3120, 2320, 4500-P-F, 4500-P-E, 4110, 4500-Si-D, 4500-Si-E, 4500-Si-F, and 2550 are incorporated by reference and shall be done in accordance with "Standard Methods for the Examination of Water and Wastewater," 17th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1989, pp. 3-32 through 3-43, 3-20 through 3-23, 3-53 through 3-63, 4-94 through 4-102, 2-57 through 2-61, 3-85 through 3-87, 2-35 through 2-39, 4-178 through 4-181, 4-177 through 4-178, 4-2 through 4-6, 4-184 through 4-187, 4-188 through 4-189, 4-189 through 4-191, and 2-80 through 2-81, respectively. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be obtained from the American Water Works Association, Customer Services, 6666 West Quincy Avenue, Denver, CO 80235, Telephone (303)794-7711. Copies may be inspected at the United States Environmental Protection Agency, 401 M Street, SW, Room EB-15, Washington, D.C. 20460 or at the Office of the Federal Register, 1100 L Street, NW, Room 8401, Washington, D.C.

⁴ The procedures I-1030-85, I-1601-85, I-2601-85, I-2598-85, I-1700-85, and I-2700-85 are incorporated by reference and shall be done in accordance with "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments," 3rd edition, U.S. Department of Interior, U.S. Geological Survey, 1989, pp. 55-56, 381-382, 383-385, 387-388, 415-416, and 417-419, respectively. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be purchased from the Books and Open-File Reports Section, U.S. Geological Survey, Federal Center, Box 25425, Denver, CO 80225. Copies may be inspected at the United States Environmental Protection Agency, 401 M Street, SW, Room EB-15, Washington, D.C. 20460 or at the Office of the Federal Register, 1100 L Street, NW, Room 8401, Washington, D.C.

⁵ "Determination of Metals and Trace Elements in Water and Wastes by Inductively-Coupled Plasma—Atomic Emission Spectrometry," Revision 3.3, April 1991, "Methods for the Determination of Metals in Environmental Samples," Office of Research and Development, Washington, D.C. 20460. EPA/600/4-91/010, June 1991.

⁶ "Determination of Trace Elements in Water and Wastes by Inductively-Coupled Plasma-Mass Spectrometry," Revision 4.4, April 1991, "Methods for the Determination of Metals in Environmental Samples," Office of Research and Development, Washington, D.C. 20460. EPA/600/4-91/010, June 1991.

⁷ "Determination of Trace Elements by Stabilized Temperature Graphite Furnace Atomic Absorption Spectrometry," Revision 1.2, April 1991, "Methods for the Determination of Metals in Environmental Samples," Office of Research and Development, Washington, D.C. 20460. EPA/600/4-91/010, June 1991.

⁸ "Determination of Inorganic Ions in Water by Ion Chromatography," Method 300.0, December 1989, U.S. EPA EMSL. This document is available from U.S. EPA, EMSL, Cincinnati, OH 45268.

⁹ For analyzing lead and copper, the technique applicable to total metals must be used and samples cannot be filtered. Samples that contain less than 1 NTU (nephelometric turbidity unit) and are properly preserved (conc. HNO₃ to pH less than 2) may be analyzed directly (without digestion) for total metals; otherwise, digestion is required. Turbidity must be measured on the preserved samples just prior to when metal analysis is initiated. When digestion is required, the "total recoverable" technique as defined in the method must be used.

(2) Analyses under this subrule shall only be conducted by laboratories that have been certified by the department. To obtain certification to conduct analyses for lead and copper, laboratories must comply with 567—Chapter 83 and:

1. Analyze performance evaluation samples which include lead and copper provided by EPA Environmental Monitoring and Support Laboratory or equivalent samples provided by the department or its designee; and

2. Achieve quantitative acceptance limits as follows:

Lead: + 30 percent of the actual amount in the Performance Evaluation sample when the actual amount is greater than or equal to 0.005 mg/l, and

Copper: + 10 percent of the actual amount in the Performance Evaluation sample when the actual amount is greater than or equal to 0.050 mg/l;

3. Achieve method detection limits as follows:

Lead: 0.001 mg/l (only if source water compositing is done); and

Copper: 0.001 mg/l or 0.020 mg/l when atomic absorption direct aspiration is used, only if source water compositing is done; or

4. Be currently certified by EPA or the department to perform analyses to the specifications described in 41.4(1)"g."

(3) All lead levels measured between the Practical Quantification Level (PQL) and the Method Detection Limit (MDL) must be either reported as measured or they can be reported as one-half the PQL (0.0025 mg/l). All levels below the lead MDL must be reported as zero.

(4) All copper levels measured between the PQL and the MDL must be either reported as measured or they can be reported as one-half the PQL (0.025 mg/l). All levels below the copper MDL must be reported as zero.

41.4(2) Lead, copper, and corrosivity regulation by the setting of an MCL. Reserved.

567—41.5(455B) Organic chemicals.

41.5(1) MCLs and other requirements for organic chemicals. Maximum contaminant levels for three classes of organic chemical contaminants specified in 41.5(1)"b" apply to community water systems and nontransient noncommunity water systems as specified herein. The three referenced organic chemical classes are volatile organic chemicals (VOCs), synthetic organic chemicals (SOCs), and trihalomethanes. The requirements also contain monitoring requirements, best available technology (BAT) identification, and analytical method requirements referenced in 41.5(1)"c," "d," and "f," respectively.

a. Applicability. The maximum contaminant levels for organic contaminants apply to community and nontransient noncommunity water systems. Compliance with the maximum contaminant level is calculated pursuant to 41.5(1)"b." The maximum contaminant level for total trihalomethanes applies only to community water systems which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process. Compliance with the maximum contaminant level for total trihalomethanes is calculated pursuant to 41.5(1)"e"(4). Total trihalomethanes is the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform).

b. *Maximum contaminant levels (MCLs) for organic compounds.* The following are the maximum contaminant levels for organic chemicals.

(1) Table One: Volatile Organic Chemicals

<u>Iowa Contaminant Code</u>	<u>Contaminant</u>	<u>MCL (mg/l)</u>
2990	Benzene	0.005
2982	Carbon tetrachloride	0.005
2968	o-Dichlorobenzene	0.6
2969	para-Dichlorobenzene	0.075
2980	1,2-Dichloroethane	0.005
2380	cis-1,2-Dichloroethylene	0.07
2977	1,1-Dichloroethylene	0.007
2979	trans-1,2-Dichloroethylene	0.1
2964	Dichloromethane	0.005
2325	1,2-Dichloropropane	0.005
2992	Ethylbenzene	0.7
2989	Monochlorobenzene	0.1
2996	Styrene	0.1
2987	Tetrachloroethylene	0.005
2991	Toluene	1
2378	1,2,4-Trichlorobenzene	0.07
2981	1,1,1-Trichloroethane	0.20
2985	1,1,2-Trichloroethane	0.005
2984	Trichloroethylene	0.005
2976	Vinyl chloride	0.002
2974	Xylenes (total)	10

(2) The following maximum contaminant levels for synthetic organic contaminants apply to community water systems and nontransient, noncommunity water systems:

Table Two: Nonvolatile Organic Chemicals

<u>Iowa Contaminant Code</u>	<u>Contaminant</u>	<u>Detect. Limit</u>	<u>MCL (mg/l)</u>
2051	Alachlor	0.0002	0.002
2047	Aldicarb	0.0005	Not set
2044	Aldicarb sulfone	0.0008	Not set
2043	Aldicarb sulfoxide	0.0005	Not set
2050	Atrazine	0.0001	0.003
2306	Benzo(a)pyrene	0.00002	0.0002
2046	Carbofuran	0.0009	0.04
2959	Chlordane	0.0002	0.002
2031	Dalapon	0.001	0.2
	Dibromochloropropane	0.00002	0.0002
	Di(2-ethylhexyl)adipate	0.0006	0.4
	Di(2-ethylhexyl)phthalate	0.0006	0.006
2041	Dinoseb	0.0002	0.007

2032	Diquat	0.0004	0.02
2105	2,4-D	0.0001	0.07
2033	Endothall	0.009	0.1
2005	Endrin	0.00001	0.002
2946	Ethylene dibromide	0.00001	0.00005
2034	Glyphosate	0.006	0.7
2065	Heptachlor	0.00004	0.0004
2067	Heptachlor epoxide	0.00002	0.0002
2274	Hexachlorobenzene	0.0001	0.001
2042	Hexachlorocyclopentadiene	0.0001	0.05
2010	Lindane	0.00002	0.0002
2015	Methoxychlor	0.0001	0.04
2036	Oxamyl (Vydate)	0.002	0.2
2326	Pentachlorophenol	0.00004	0.001
2040	Picloram	0.0001	0.5
2383	Polychlorinated biphenyls	0.0001	0.0005
2037	Simazine	0.00007	0.004
2020	Toxaphene	0.001	0.003
2063	2,3,7,8-TCDD (Dioxin)	5×10^{-9}	3×10^{-8}
2110	2,4,5-TP (Silvex)	0.0002	0.05

(3) Table Three: Trihalomethanes

<u>Contaminant</u>	<u>MCL (mg/l)</u>
Total trihalomethanes (the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform))	0.10

(4) Organic chemical compliance calculations (other than total trihalomethanes). Compliance with 41.5(1)“b”(1) shall be determined based on the analytical results obtained at each sampling point.

1. For systems which are conducting monitoring at a frequency greater than annual, compliance is determined by a running annual average of all samples taken at each sampling point. If the annual average of any sampling point is greater than the MCL, then the system is out of compliance. If the initial sample or a subsequent sample causes the annual average to be exceeded, then the system is out of compliance immediately. Any samples below the detection limit shall be calculated as zero for purposes of determining the annual average.

2. If monitoring is conducted annually, or less frequently, the system is out of compliance if the level of a contaminant at any sampling point is greater than the MCL. If a confirmation sample is required by the department, the determination of compliance will be based on the average of two samples.

3. If a public water system has a distribution system separable from other parts of the distribution system with no interconnections, the department may allow the system to give public notice to only that portion of the system which is out of compliance.

(5) Treatment techniques for acrylamide and epichlorohydrin. Each public water supply system must certify annually in writing to the department (using third party or manufacturer's certification) that when acrylamide and epichlorohydrin are used in drinking water systems, the combination (or product) of dose and monomer level does not exceed the levels specified as follows:

Acrylamide = 0.05% dosed at 1 ppm (or equivalent)

Epichlorohydrin = 0.01% dosed at 20 ppm (or equivalent)

Certifications can rely on information provided by manufacturers or third parties, as approved by the department.

c. *Organic chemical monitoring requirements.* Each public water system shall monitor at the time designated within each compliance period.

(1) Routine volatile organic chemical (VOC) monitoring requirements. Beginning on January 1, 1993, community water supplies and NTNC water supplies shall conduct monitoring of the contaminants listed in 41.5(1) "b"(1) for the purpose of determining compliance with the maximum contaminant level.

(2) VOC monitoring protocol.

1. VOC groundwater monitoring protocol. Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a source/entry point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant, or within the distribution system.

2. VOC surface water monitoring protocol. Surface water systems (and combined surface/groundwater systems) shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a source/entry point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant, or within the distribution system.

3. Multiple sources. If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water representative of all sources is being used).

4. Initial VOCs monitoring frequency. Each community and nontransient noncommunity water system shall take four consecutive quarterly samples for each contaminant listed in 41.5(1) "b"(1) during each compliance period, beginning in the initial compliance period. If the initial monitoring for contaminants listed in 41.5(1) "b"(1) has been completed by December 31, 1992, and the system did not detect any contaminant listed in 41.5(1) "b"(1), then each groundwater and surface water system shall take one sample annually beginning with the initial compliance period.

5. Reduced VOC monitoring for groundwater systems. After a minimum of three years of annual sampling, the department may allow groundwater systems with no previous detection of any contaminant listed in 41.5(1) "b"(1) to take one sample during each compliance period.

6. VOC monitoring waivers. Each community and nontransient noncommunity groundwater system which does not detect a contaminant listed in 41.5(1) "b"(1) may apply to the department for a waiver from the requirements of 41.5(1) "c"(1) "4" and "5" after completing the initial monitoring. A waiver shall be effective for no more than six years (two compliance periods). The department may also issue waivers to small systems for the initial round of monitoring for 1,2,4-trichlorobenzene. Detection is defined as greater than or equal to 0.0005 mg/l.

7. Bases of a VOC monitoring waiver. The department may grant a waiver if the department finds that there has not been any knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the system. If previous use of the contaminant is unknown or it has been used previously, then the following factors shall be used to determine whether a waiver is granted.

- Previous analytical results.
- The proximity of the system to a potential point or nonpoint source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities.
- The environmental persistence and transport of the contaminants.
- The number of persons served by the public water system and the proximity of a smaller system to a larger system, and

- How well the water source is protected against contamination, such as whether it is a surface or groundwater system. Groundwater systems must consider factors such as depth of the well, the type of soil, and wellhead protection. Surface water systems must consider watershed protection.

8. VOC monitoring waiver requirements for groundwater systems. As a condition of the waiver, a groundwater system must take one sample at each sampling point during the time the waiver is effective (i.e., one sample during two compliance periods or six years) and update its vulnerability assessment considering the factors listed in 41.5(1)“c”(2)“7.” Based on this vulnerability assessment the department must reconfirm that the system is nonvulnerable. If the department does not reconfirm within three years of the initial vulnerability determination, then the waiver is invalidated and the system is required to sample annually as specified in 41.5(1)“c”(2)“4.”

9. VOC monitoring waiver requirements for surface water systems. Each community and non-transient noncommunity surface water system which does not detect a contaminant listed in 41.5(1)“b”(1) may apply to the department for a waiver from the requirements of 41.5(1)“c”(2)“4” after completing the initial monitoring. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Systems meeting this criterion must be determined by the department to be nonvulnerable based on a vulnerability assessment during each compliance period. Each system receiving a waiver shall sample at the frequency specified by the department (if any).

10. Increased VOC monitoring. If a contaminant listed in 41.5(1)“b”(1) is detected at a level exceeding 0.0005 mg/l in any sample, then:

The system must monitor quarterly at each sampling point which resulted in a detection.

The department may decrease the quarterly monitoring requirement specified in 41.5(1)“c”(2)“4” provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case shall the department make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.

If the department determines that the system is reliably and consistently below the MCL, the department may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter(s) which previously yielded the highest analytical result.

Systems which have three consecutive annual samples with no detection of a contaminant may apply to the department for a waiver as specified in 41.5(1)“c”(2)“6.”

Groundwater systems which have detected one or more of the following two-carbon organic compounds: trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, or 1,1-dichloroethylene shall monitor quarterly for vinyl chloride. A vinyl chloride sample shall be taken at each sampling point at which one or more of the two-carbon organic compounds was detected. If the results of the first analysis do not detect vinyl chloride, the department may reduce the quarterly monitoring frequency of vinyl chloride monitoring to one sample during each compliance period. Surface water systems are required to monitor for vinyl chloride as specified by the department.

11. VOCs reliably and consistently below the MCL. Systems which violate the MCL requirements of 41.5(1)“b”(1) must monitor quarterly. After a minimum of four consecutive quarterly samples which show the system is in compliance and the department determines that the system is reliably and consistently below the maximum contaminant level, the system may monitor at the frequency and times specified in 41.5(1)“c”(2)“10,” third unnumbered paragraph (following approval by the department).

(3) Routine and repeat synthetic organic chemical (SOC) monitoring requirements. Analysis of the contaminants listed in 41.5(1)“b”(2) for the purposes of determining compliance with the maximum contaminant level shall be conducted as follows:

1. SOC groundwater monitoring protocols. Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a source/entry point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

2. SOC surface water monitoring protocols. Surface water systems shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a source/entry point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant. For purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.

3. Multiple sources. If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water representative of all sources is being used).

4. SOC monitoring frequency. Community and nontransient noncommunity water systems shall take four consecutive quarterly samples for each contaminant listed in 41.5(1)“b”(2) during each compliance period beginning with the compliance period starting January 1, 1993. Systems serving more than 3,300 persons which do not detect a contaminant in the initial compliance period may reduce the sampling frequency to a minimum of two quarterly samples in one year during each repeat compliance period. Systems serving less than or equal to 3,300 persons which do not detect a contaminant in the initial compliance period may reduce the sampling frequency to a minimum of one sample during each repeat compliance period.

5. SOC monitoring waivers. Each community and nontransient water system may apply to the department for a waiver from the requirements of 41.5(1)“c”(3)“4.” A system must reapply for a waiver for each compliance period.

6. Bases of an SOC monitoring waiver. The department may grant a waiver if the department finds that there has been no knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the system. If previous use of the contaminant is unknown or it has been used previously, then the department shall determine whether a waiver may be granted by considering:

- Previous analytical results.
- The proximity of the system to a potential point or nonpoint source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities. Nonpoint sources include the use of pesticides to control insect and weed pests on agricultural areas, forest lands, home and gardens, and other land application uses.
- The environmental persistence and transport of the pesticide or PCBs.
- How well the water source is protected against contamination due to such factors as depth of the well and the type of soil and the integrity of the well casing.
- Elevated nitrate levels at the water supply source, and
- Use of PCBs in equipment used in the production, storage, or distribution of water (i.e., PCBs used in pumps and transformers).

7. Increased SOC monitoring. If an organic contaminant listed in 41.5(1)“b”(2) is detected in any sample, then:

- Each system must monitor quarterly at each sampling point which resulted in a detection.
- The department may decrease the quarterly monitoring requirement specified in 41.5(1)“c”(3)“7” provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case shall the department make this determination unless a ground-water system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.
- After the department determines the system is reliably and consistently below the maximum contaminant level the system may monitor annually. Systems which monitor annually must monitor during the quarter that previously yielded the highest analytical result.
- Systems which have three consecutive annual samples with no detection of a contaminant may apply to the department for a waiver as specified in 41.5(1)“c”(3)“6.”

- If monitoring results in detection of one or more of certain related contaminants (aldicarb, aldicarb sulfone, aldicarb sulfoxide, heptachlor, and heptachlor epoxide), then subsequent monitoring shall analyze for all related contaminants.

8. MCL violation and reliably/consistently below the MCL. Systems which violate the requirements of 41.5(1)“b” must monitor quarterly. After a minimum of four quarterly samples show the system is in compliance and the department determines the system is reliably and consistently below the MCL, the system shall monitor at the frequency specified in 41.5(1)“c”(3)“7.”

(4) Organic chemical (SOC and VOC) confirmation samples. The department may require a confirmation sample for positive or negative results. If a confirmation sample is required by the department, the result must be averaged with the first sampling result and the average is used for the compliance determination as specified by 41.5(1)“b”(4). The department has discretion to delete results of obvious sampling errors from this calculation.

(5) Organic chemical (SOC and VOC) composite samples. The department may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory and analyzed within 14 days of sample collection.

1. If the concentration in the composite sample is greater than or equal to 0.0005 mg/l for any contaminant listed in 41.5 (1)“b”(1) and (2), then a follow-up sample must be taken and analyzed within 14 days from each sampling point included in the composite.

2. If duplicates of the original sample taken from each sampling point used in the composite are available, the system may use these instead of resampling. The duplicate must be analyzed and the results reported to the department within 14 days of collection.

3. Compositing may only be permitted by the department at sampling points within a single system, unless the population served by the system is less than 3,300 persons. In systems serving less than or equal to 3,300 persons, the department may permit compositing among different systems provided the five-sample limit is maintained.

4. Compositing samples prior to gas chromatographic analysis.

- Add 5 ml or equal larger amounts of each sample (up to five samples are allowed) to a 25 ml glass syringe. Special precautions must be made to maintain zero headspace in the syringe.

- The samples must be cooled at 4 degrees Celsius during this step to minimize volatilization losses.

- Mix well and draw out a 5-ml aliquot for analysis.

- Follow sample introduction, purging, and desorption steps described in the method.

- If less than five samples are used for compositing, a proportionately small syringe may be used.

5. Compositing samples prior to gas chromatographic/mass spectrometric analysis.

- Inject 5 ml or equal larger amounts of each aqueous sample (up to five samples are allowed) into a 25-ml purging device using the sample introduction technique described in the method.

- The total volume of the sample in the purging device must be 25 ml.

- Purge and desorb as described in the method.

6. Grandfathered organic chemical (SOC and VOC) data. The department may allow the use of monitoring data collected after January 1, 1988, for VOCs and January 1, 1990, for SOC's required under Section 1445 of the Safe Drinking Water Act for purposes of initial monitoring compliance. If the data are generally consistent with the other requirements in this subparagraph, the department may use such data (i.e., a single sample rather than four quarterly samples) to satisfy the initial monitoring requirement for the initial compliance period beginning January 1, 1993. Systems which use grandfathered samples for VOCs and did not detect any contaminants listed in 41.5(1)“b”(1) shall begin monitoring annually in accordance with 41.5(1)“c”(2) beginning January 1, 1993.

7. Increased organic chemical (SOC and VOC) sampling. The department may increase required monitoring where necessary to detect variations within the system.

8. Increased organic chemical (SOC and VOC) monitoring. The department may increase the required monitoring frequency, where necessary, to detect variations within the system (e.g., fluctua-

tions in concentration due to seasonal use, changes in water source, changes to treatment facilities or normal operation thereof).

9. Organic chemical (SOC and VOC) vulnerability assessment criteria. Vulnerability of each public water system shall be determined by the department based upon an assessment of the following factors.

- VOC vulnerability assessment criteria—previous monitoring results. A system will be classified vulnerable if any sample was analyzed to contain one or more contaminants listed in 41.5(1) “b”(1)-(VOCs) or 41.5(1) “b”(3) except for trihalomethanes or other demonstrated disinfection by-products.
- SOC vulnerability assessment criteria—previous monitoring results. A system will be classified vulnerable if any sample was analyzed to contain one or more contaminants listed in 41.5(1) “b”(2)-(SOCs) or 41.5(1) “b”(3) except for trihalomethanes or other demonstrated disinfection by-products.
- Proximity of surface water supplies to commercial or industrial use, disposal or storage of volatile synthetic organic chemicals. Surface waters which withdraw water directly from reservoirs are considered vulnerable if the drainage basin upgradient and within two miles of the shoreline at the maximum water level contains major transportation facilities such as primary highways or railroads or any of the contaminant sources listed in this subparagraph. Surface water supplies which withdraw water directly from flowing water courses are considered vulnerable if the drainage basin upgradient and within two miles of the water intake structure contains major transportation facilities such as primary highways or railroads or any of the contaminant sources listed in this subparagraph.
- Proximity of supplies to commercial or industrial use, disposal or storage of volatile synthetic organic chemicals. Wells that are not separated from sources of contamination by at least the following distances will be considered vulnerable.

<u>Sources of Contamination</u>	<u>Shallow Wells as defined in 567—40.2(455B)</u>	<u>Deep Wells as defined in 567—40.2(455B)</u>
Sanitary and industrial point discharges	400 ft.	400 ft.
Mechanical waste treatment plants	400 ft.	200 ft.
Lagoons	1,000 ft.	400 ft.
Chemical and storage (above ground)	200 ft.	100 ft.
Chemical and mineral storage including underground storage tanks on or below ground	400 ft.	200 ft.
Solid waste disposal site	1,000 ft.	1,000 ft.

- A system is deemed to be vulnerable for a period of three years after any positive measurement of one or more contaminants listed in 41.5(1) “b”(3) except for trihalomethanes or other demonstrated disinfection by-products.

d. *Best available technology(ies) (BATs).* Organic chemical (SOC and VOC) BATs. The department identifies as indicated in the table below either granular activated carbon (GAC), packed tower aeration (PTA), or oxidation (OXID) as the best available technology, treatment technique, or other means available for achieving compliance with the maximum contaminant level for organic contaminants identified in 41.5(1) “b”:

BAT for organic contaminants listed in subrule 41.5(1) “b”			
<u>Contaminant</u>	<u>GAC</u>	<u>PTA</u>	<u>OXID</u>
Alachlor	X		
Aldicarb	X		

Aldicarb sulfone	X		
Aldicarb sulfoxide	X		
Atrazine	X		
Benzene	X	X	
Benzo(a)pyrene	X		
Carbofuran	X		
Carbon tetrachloride	X	X	
Chlordane	X		
Dalapon	X		
Dibromochloropropane (DBCP)	X	X	
2,4-D	X		
o-Dichlorobenzene	X	X	
para-Dichlorobenzene	X	X	
1,2-Dichloroethane	X	X	
cis-1,2-Dichloroethylene	X	X	
trans-1,2-Dichloroethylene	X	X	
1,1-Dichloroethylene	X	X	
Dichloromethane		X	
1,2-Dichloropropane	X	X	
Di(2-ethylhexyl)adipate	X	X	
Di(2-ethylhexyl)phthalate	X		
Dinoseb	X		
Diquat	X		
Endothall	X		
Endrin	X		
Ethylene Dibromide (EDB)	X	X	
Ethylbenzene	X	X	
Glyphosate			X
Heptachlor	X		
Heptachlor epoxide	X		
Hexachlorobenzene	X		
Hexachlorocyclopentadiene	X	X	
Lindane	X		
Methoxychlor	X		
Monochlorobenzene	X	X	
Oxamyl (Vydate)	X		
Pentachlorophenol	X		
Picloram	X		
Polychlorinated biphenyls (PCB)	X		
Simazine	X		
Styrene	X	X	
2,4,5-TP (Silvex)	X		
Tetrachloroethylene	X	X	
1,2,4-Trichlorobenzene	X	X	
1,1,1-Trichloroethane	X	X	

1,1,2-Trichloroethane	X	X
Trichloroethylene	X	X
2,3,7,8-TCDD (Dioxin)	X	
Toluene	X	
Toxaphene	X	X
Vinyl chloride		X
Xylene	X	X

e. Total trihalomethanes sampling, analytical and other requirements. The maximum contaminant level for total trihalomethanes applies to community water systems which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the treatment process. Compliance with the maximum contaminant level is calculated pursuant to 41.5(1) “b”(3). Total trihalomethanes is the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform).

(1) Community water systems which serve a population of 10,000 or more individuals and which add disinfectant (oxidant) to the water in any part of the drinking water treatment process shall analyze for total trihalomethanes in accordance with this subrule. For the purpose of this subrule, samples to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing water from a single aquifer may, with approval of the department, be considered as one treatment plant for determining the minimum number of samples. All samples required within a calendar quarter shall be collected within a 24-hour period.

(2) General sampling requirements.

1. For all community water systems utilizing surface water sources in whole or in part, and for all community water systems utilizing only groundwater sources that have not been determined by the department to qualify for the monitoring requirements of 41.5(1) “e”(3), analyses for total trihalomethanes shall be performed at quarterly intervals on at least four water samples for each treatment plant used by the system. At least 25 percent of the samples shall be taken at locations within the distribution system reflecting the maximum residence time of the water in the system. The remaining 75 percent shall be taken at representative locations in the distribution system, taking into account number of persons served, different sources of water and different treatment methods employed. The results of all analyses per quarter shall be arithmetically averaged. All samples collected shall be used in the computation of the average, unless the analytical results are invalidated for technical reasons. Sampling and analyses shall be conducted in accordance with the methods listed in 41.5(1) “e”(5).

2. The department may allow a community water system to reduce the monitoring frequency required by 41.5(1) “e”(2) “1” to a minimum of one sample analyzed for TTHMs per quarter taken at a point in the distribution system reflecting the maximum residence time of the water in the system, upon a determination by the department that the data from at least one year of monitoring in accordance with 41.5(1) “e”(2) “1” and local conditions demonstrate that total trihalomethane concentrations will be consistently below the maximum contaminant level.

3. If at any time during which the reduced monitoring frequency prescribed under 41.5(1) “e”(2) “2” applies, the results from any analysis exceed 0.10 mg/l of TTHMs and such results are confirmed by at least one check sample taken promptly after such results are received, or if the system makes any significant change to its source of water or treatment program, the system shall immediately begin monitoring in accordance with the requirements of 41.5(1) “e”(2) “1” which monitoring shall continue for at least one year before the frequency may be reduced again. The department may increase a system’s monitoring frequency above the minimum in those cases where the department determines it is necessary to detect variations of TTHM levels within the distribution system.

(3) Groundwater sampling requirements.

1. The department may allow a community water system utilizing only groundwater sources to reduce the monitoring frequency required by 41.5(1) “e”(2) “1” to a minimum of one sample for maximum TTHM potential per year for each treatment plant used by the system taken at a point in the dis-

tribution system reflecting maximum residence time of the water in the system. The system's monitoring frequency may only be reduced upon a determination by the department that, based upon the data submitted by the system, the system has a maximum TTHM potential of less than 0.10 mg/l and that, based upon an assessment of the local conditions of the system, the system is not likely to approach or exceed the maximum contaminant level for TTHMs. All samples collected shall be used for determining whether the system must comply with the monitoring requirements of 41.5(1)"e"(2), unless the analytical results are invalidated for technical reasons. Sampling and analyses shall be conducted in accordance with the methods listed in 41.5(1)"e"(5).

2. If at any time during which the reduced monitoring frequency prescribed under 41.5(1)"e"(3)"1" applies, the results from any analysis taken by the system for the maximum TTHM potential are equal to or greater than 0.10 mg/l, and such results are confirmed by at least one check sample taken promptly after such results are received, the system shall immediately begin monitoring in accordance with the requirements of 41.5(1)"e"(2) and such monitoring shall continue for at least one year before the frequency may be reduced again. In the event of any significant change to the system's raw water or treatment program, the system shall immediately analyze an additional sample for maximum TTHM potential taken at a point in the distribution system reflecting maximum residence time of the water in the system for the purpose of determining whether the system must comply with the monitoring requirements of 41.5(1)"e"(2). The department may increase monitoring frequencies above the minimum in those cases where the department determines it is necessary to detect variation of TTHM levels within the distribution system.

(4) Compliance with 41.5(1)"b"(3) shall be determined based on a running annual average of quarterly samples collected by the system as prescribed in 41.5(1)"e"(2)"1" or 41.5(1)"e"(2)"2." If the average of samples covering any 12-month period exceeds the maximum contaminant level, the supplier of water shall notify the public pursuant to 41.10(2). Monitoring after public notification shall be at a frequency designated by the department and shall continue until a monitoring schedule as a condition to an operation permit or enforcement action shall become effective.

(5) Sampling and analyses made pursuant to this subrule shall be conducted by one of the following approved methods:

1. "The Analysis of Trihalomethanes in Finished Waters by the Purge and Trap Method," Method 501.1, EMSL, EPA, Cincinnati, Ohio.

2. "The Analysis of Trihalomethanes in Drinking Water by Liquid/Liquid Extraction," Method 501.2, EMSL, EPA, Cincinnati, Ohio.

Samples for TTHM shall be dechlorinated upon collection to prevent further production of trihalomethanes, according to the procedures described in the above two methods. Samples for maximum TTHM potential should not be dechlorinated, and should be held for seven days at 25 degrees Celsius prior to analysis, according to the procedures described in the above two methods.

(6) Before a community water system makes any modifications to its existing treatment process for the purposes of achieving compliance with 41.5(1)"b"(3) such system must submit and obtain department approval of a plan setting forth its proposed modification and any safeguards that it will implement to ensure that the bacteriological quality of the drinking water served by such system will not be adversely affected by such modification.

Each system shall comply with the provisions set forth in the department-approved plan. At a minimum, a department-approved plan shall require any system modifying its disinfection practice to:

1. Evaluate the water system for sanitary defects and evaluate the source for biological quality;

2. Evaluate its existing treatment practices and consider improvements that will minimize disinfectant demand and optimize finished water quality throughout the distribution system;

3. Provide baseline water quality survey data of the distribution system required by the department;

4. Conduct any additional monitoring determined by the department to be necessary to ensure continued maintenance of optimal biological quality in the finished water; and

5. Demonstrate an active disinfectant residual throughout the distribution system at all times during and after the modification.

Before a community water system makes any modifications to its existing physical treatment plant for the purpose of achieving compliance with 41.5(1)“b”(3), such system must obtain department approval in accordance with 567—43.3(455B).

f. Analytical procedures—organics.

(1) Endrin monitoring. Monitoring of endrin for purposes of determining compliance with the maximum contaminant level listed in 41.5(1)“b” shall be conducted as follows:

Endrin analysis. Analysis made to determine compliance with the maximum contaminant level for endrin in 41.5(1)“b” shall be made in accordance with EPA Methods 505, “Analysis of Organohalide Pesticides and Commercial Polychlorinated Biphenyl Products (Aroclors) in Water by Microextraction and Gas Chromatography” and 508, “Determination of Chlorinated Pesticides in Water by Gas Chromatography With an Electron Capture Detector.” The methods are contained in “Methods for the Determination of Organic Compounds in Drinking Water,” ORD Publications, CERL, EPA/600/4-88/039, December 1988. These methods are available from the National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. The toll-free telephone number is 1-800-336-4700.

(2) Volatile organic chemical (VOC) analytical methods. Analysis for the contaminants listed in 41.5(1)“b”(1) shall be conducted using the following EPA methods or their equivalent as approved by EPA. These methods are contained in “Methods for the Determination of Organic Compounds in Drinking Water,” EPA/600/4-88/039, and are available from the National Technical Information Service (NTIS) NTIS PB91-231480 and PB91-146027, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

1. Method 502.1, “Volatile Halogenated Organic Chemicals in Water by Purge and Trap Gas Chromatography.”

2. Method 502.2, “Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series.”

3. Method 503.1, “Volatile Aromatic and Unsaturated Organic Compounds in Water by Purge and Trap Gas Chromatography.”

4. Method 524.1, “Measurement of Purgeable Organic Compounds in Water by Purged Column Gas Chromatography/Mass Spectrometry.”

5. Method 524.2, “Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry.”

(3) Synthetic organic chemical (SOC) analytical methods. Analysis for the contaminants listed in 41.5(1)“b” shall be conducted using the following EPA methods or their equivalent as approved by EPA. These methods are contained in “Methods for the Determination of Organic Compounds in Drinking Water,” ORD Publications, CERL, EPA/600/4-88/039, December 1988.

1. Method 504, “1,2-Dibromoethane (EDB) and 1,2-Dibromo-3-chloropropane (DBCP) in Water by Microextraction and Gas Chromatography.” Method 504 can be used to measure dibromochloropropane (DBCP) and ethylene dibromide (EDB).

2. Method 505, “Analysis of Organohalide Pesticides and Commercial Polychlorinated Biphenyl Products (Aroclors) in Water by Microextraction and Gas Chromatography.” Method 505 can be used to measure alachlor, atrazine, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor, toxaphene and simazine. Method 505 can be used as a screen for PCBs.

3. Method 507, “Determination of Nitrogen- and Phosphorus-Containing Pesticides in Ground Water by Gas Chromatography with a Nitrogen-Phosphorus Detector.” Method 507 can be used to measure alachlor, atrazine and simazine.

4. Method 508, “Determination of Chlorinated Pesticides in Water by Gas Chromatography with an Electron Capture Detector.” Method 508 can be used to measure chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, lindane, methoxychlor and toxaphene. Method 508 can be used as a screen for PCBs.

5. Method 508A, "Screening of Polychlorinated Biphenyls by Perchlorination and Gas Chromatography." Method 508A is used to quantitate PCBs as decachlorobiphenyl if detected in Method 505 or 508.

6. Method 515.1, "Determination of Chlorinated Acids in Water by Gas Chromatography with an Electron Capture Detector." Method 515.1 can be used to measure 2,4-D, dalapon, dinoseb, pentachlorophenol, picloram and 2,4,5-TP (Silvex).

7. Method 525.1, "Determination of Organic Compounds in Drinking Water by Liquid-Solid Extraction and Capillary Column Gas Chromatography/Mass Spectrometry." Method 525.1 can be used to measure alachlor, atrazine, chlordane, di(2-ethylhexyl)adipate, di(2-ethylhexyl)phthalate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor, pentachlorophenol, polynuclear aromatic hydrocarbons, simazine, and toxaphene.

8. Method 531.1, "Measurement of N-Methyl Carbamoyloximes and N-Methyl Carbamates in Water by Direct Aqueous Injection HPLC with Post-Column Derivatization." Method 531.1 can be used to measure aldicarb, aldicarb sulfoxide, aldicarb sulfone, carbofuran and oxamyl.

9. Method 1613, "Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution." Method 1613 can be used to measure 2,3,7,8-TCDD (dioxin). This method is available from USEPA-OST, Sample Control Center, P.O. Box 1407, Alexandria, VA 22313.

10. Method 547, "Analysis of Glyphosate in Drinking Water by Direct Aqueous Injection HPLC with Post-Column Derivatization." Method 547 can be used to measure glyphosate.

11. Method 548, "Determination of Endothall in Aqueous Samples." Method 548 can be used to measure endothall.

12. Method 549, "Determination of Diquat and Paraquat in Drinking Water by High Performance Liquid Chromatography with Ultraviolet Detection." Method 549 can be used to measure diquat.

13. Method 550, "Determination of Polycyclic Aromatic Hydrocarbons in Drinking Water by Liquid-Liquid Extraction and HPLC with Coupled Ultraviolet and Fluorescence Detection." Method 550 can be used to measure benzo(a)pyrene and other polynuclear aromatic hydrocarbons.

14. Method 550.1, "Determination of Polycyclic Aromatic Hydrocarbons in Drinking Water by Liquid-Solid Extraction and HPLC and Coupled Ultraviolet and Fluorescence Detection." Method 550.1 can be used to measure benzo(a)pyrene and other polynuclear aromatic hydrocarbons.

(4) Analysis for PCBs shall be conducted as follows:

1. Each system which monitors for PCBs shall analyze each sample using either Method 505 or Method 508 pursuant to 41.5(1)"f"(3).

2. If PCBs (as one of seven Aroclors) are detected (as designated in this paragraph) in any sample analyzed using Method 505 or 508, the system shall reanalyze the sample using Method 508A to quantitate PCBs (as decachlorobiphenyl).

PCB AROCLOR DETECTION LIMITS

<u>Aroclor</u>	<u>Detection Limit (mg/l)</u>
1016	0.00008
1221	0.02
1232	0.0005
1242	0.0003
1248	0.0001
1254	0.0001
1260	0.0002

3. Compliance with the PCB MCL shall be determined based upon the quantitative results of analyses using Method 508A.

41.5(2) *Organic chemicals occurring as (nontrihalomethane) disinfection by-products.* Reserved.

567—41.6(455B) Turbidity. Rescinded IAB 8/18/93, effective 9/22/93.

567—41.7(455B) Physical properties maximum contaminant levels (MCL or treatment technique requirements) and monitoring requirements.

41.7(1) Turbidity.

a. *Applicability.* The maximum contaminant levels (treatment technique requirements) for turbidity are applicable to community and noncommunity public water supply systems using surface water or groundwater under the direct influence of surface water in whole or in part. A system providing filtration on or before December 30, 1991, shall meet the requirements of this subrule on June 29, 1993. A system providing filtration after December 30, 1991, shall meet the requirements of this subrule when filtration is installed. The department may require and the system shall comply with any interim turbidity requirements the department deems necessary. Failure to meet any requirement of this subrule, in accordance with 567—43.5(455B), after the date specified in this paragraph is a treatment technique violation.

b. *Maximum contaminant levels (MCL or treatment technique requirement) for turbidity.* The maximum contaminant levels (treatment technique requirements) for turbidity in drinking water, measured at representative entry point(s) to the distribution system, are as follows:

(1) Conventional filtration treatment or direct filtration.

1. For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.5 nephelometric turbidity units (NTU) in at least 95 percent of the measurements taken each month when measured as specified in 41.7(1)"c" and "e."

2. The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU when measured as specified in 41.7(1)"c" and "e."

(2) Slow sand filtration.

1. For systems using slow sand filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month when measured as specified in 41.7(1)"c" and "e."

2. The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU when measured as specified in 41.7(1)"c" and "e."

(3) Diatomaceous earth filtration.

1. For systems using diatomaceous earth filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month when measured as specified in 41.7(1)"c" and "e."

2. The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU when measured as specified in 41.7(1)"c" and "e."

(4) Other filtration technologies. A public water system may use either a filtration technology not listed in 41.7(1)"b"(1) to 41.7(1)"b"(3) or a filtration technology listed in 41.7(1)"b"(1) and (2) at a higher turbidity level if it demonstrates to the department through a preliminary report submitted by a registered professional engineer, using pilot plant studies or other means, that the alternative filtration technology in combination with disinfection treatment that meets the requirements of 567—subrule 43.5(2), consistently achieves 99.9 percent removal or inactivation of lamblia and 99.99 percent removal or inactivation of viruses. For a system that uses alternative filtration technology and makes this demonstration, the maximum contaminant levels (treatment technique requirements) for turbidity are as follows:

1. The turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month when measured as specified in 41.7(1)"c" and "e."

2. The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU when measured as specified in 41.7(1) "c" and "e."

c. Monitoring requirements.

(1) Routine turbidity monitoring. Turbidity measurements as required by 567—subrule 43.5(3) must be performed on representative samples of the system's filtered water every four hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a calibration protocol approved by the department and audited for compliance during sanitary surveys. Major elements of the protocol shall include, but are not limited to: method of calibration, calibration frequency, calibration standards, documentation, data collection and data reporting. For any systems using slow sand filtration or filtration treatment other than conventional treatment, direct filtration, or diatomaceous earth filtration, the department may reduce the sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance. For systems serving 500 or fewer persons, the department may reduce the turbidity sampling frequency to once per day, regardless of the type of filtration treatment used, if the department determines that less frequent monitoring is sufficient to indicate effective filtration performance. Approval shall be based upon documentation provided by the system, acceptable to the department and pursuant to the conditions of an operation permit.

(2) A supplier of water serving a population or population equivalent of greater than 100,000 persons shall provide a continuous or rotating cycle turbidity monitoring and recording device or take hourly grab samples to determine compliance with 41.7(1) "b."

d. Reserved.

e. Analytical methodology. Public water systems shall conduct turbidity analysis in accordance with 567—subrule 43.5(4) and the following analytical method. Measurements for turbidity shall be conducted by a Grade II, III or IV operator meeting the requirements of 567—Chapter 81, any person under the supervision of a Grade II, III or IV operator meeting the requirements of 567—Chapter 81, or a laboratory certified by the department to perform analysis under 567—Chapter 83.

(1) Turbidity monitoring shall be conducted in accordance with Method 2130B (Nephelometric Method), pp. 2-13 to 2-16, as set forth in "Standard Methods" (17th Edition).

(2) Reporting. The public water supply system shall report the results of the turbidity analysis in accordance with 567—subrules 43.7(1) and 43.7(3).

41.7(2) Residual disinfectant.

a. Applicability. Public water supply systems which apply chlorine shall monitor, record, and report the concentrations daily in accordance with 567—subparagraph 43.7(1) "b"(5). In addition, all public water supply systems that use a surface water source or a groundwater source under the direct influence of surface water must provide treatment consisting of disinfection, as specified in 567—subrule 43.5(2), and filtration treatment, as specified in 567—subrule 43.5(3), and shall monitor for the residual disinfectant concentration in both the water entering the distribution system and in the distribution system and shall report the results of that analysis in accordance with 567—subrule 43.7(3).

b. Maximum contaminant levels. Reserved.

c. Monitoring requirements. Public water supplies that use surface water or groundwater under the direct influence of surface water shall monitor for the residual disinfectant concentration in both the water entering the distribution system and in water in the distribution system so as to demonstrate compliance with 567—subrule 43.5(2).

(1) Disinfectant residual entering system. Residual disinfectant concentration of the water entering the distribution system shall be monitored continuously, and the lowest value recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every four hours may be conducted in lieu of continuous monitoring, but not to exceed five working days following the failure of the equipment. Systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies prescribed below:

<u>System size (persons served)</u>	<u>Samples per day (*)</u>
less than 500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

(*)When more than one grab sample is required per day, the day’s samples cannot be taken at the same time. The sampling intervals must be at a minimum of four-hour intervals.

If at any time the disinfectant concentration falls below 0.3 mg/l in a system using grab sampling in lieu of continuous monitoring, the system shall take a grab sample every four hours until the residual disinfectant concentration is equal to or greater than 0.3 mg/l.

(2) Disinfectant residual in system. The residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in 41.2(1)“c,” except that the department may allow a public water system which uses both a surface water source or a groundwater source under direct influence of surface water, and a groundwater source to take disinfectant residual samples at points other than the total coliform sampling points, if these points are included as a part of the coliform sample site plan meeting the requirements of 41.2(1)“c”(1)“1” and the department determines that such points are representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count as specified in 41.2(3), may be measured in lieu of residual disinfectant concentration.

d. BAT. Reserved.

e. Analytical methodology. Measurements for residual disinfectant concentration shall be conducted by a Grade II, III, or IV operator meeting the requirements of 567—Chapter 81, any person under the supervision of a Grade II, III, or IV operator meeting the requirements of 567—Chapter 81, or a laboratory certified by the department to perform analysis under 567—Chapter 83.

(1) Residual disinfectant concentrations for free chlorine and combined chlorine (chloramines) must be measured by Method 4500-Cl D. and E. (Amperometric Titration Method), pp. 4-54 to 4-58, Method 4500-Cl F. (DPD Ferrous Titrimetric Method), pp. 4-58 to 4-62, Method 4500-Cl G. (DPD Colorimetric Method), pp. 4-62 to 4-65 “Standard Methods,” 17th Edition or Method 408F (Leuco Crystal Violet Method), pp. 310-313, as set forth in “Standard Methods,” 16th Edition. Residual disinfectant concentrations for free chlorine and combined chlorine may also be measured by using DPD colorimetric test kits. Residual disinfectant concentrations for ozone must be measured by the Indigo Method as set forth in Bader, H., Hoigne, J., “Determination of Ozone in Water by the Indigo Method; A Submitted Standard Method”; Ozone Science and Engineering, Vol. Number 4, pp. 169-176, Pergamon Press Ltd., 1982, or automated methods which are calibrated in reference to the results obtained by the Indigo Method on a regular basis. NOTE: The Indigo Method has been published in the 17th Edition of “Standard Methods,” pp. 4-162 to 4-165; the Iodometric Method in the 16th Edition may not be used.

Residual disinfectant concentrations for chlorine dioxide must be measured by Method 4500-ClO₂ C. (Amperometric Method) or Method 45-ClO₂D. (DPD Method) pp. 4-78 to 4-80, as set forth in “Standard Methods.”

(2) Reporting. The public water supply system shall report the results in compliance with 567—subrules 43.7(1) and 43.7(3).

41.7(3) Temperature.

- a. *Applicability.* Reserved.
- b. *Maximum contaminant levels.* Reserved.
- c. *Monitoring requirements.* Reserved.
- d. *BAT.* Reserved.

e. *Analytical methodology.* Measurements for temperature must be conducted by a Grade II, III or IV operator meeting the requirements of 567—Chapter 81, any person under the supervision of a Grade II, III or IV operator meeting the requirements of 567—Chapter 81, or a laboratory certified by the department to perform analysis under 567—Chapter 83. Temperature shall be determined in compliance with Method 2550 (Temperature), p. 2-59, as set forth in “Standard Methods,” 18th Edition.

41.7(4) Hydrogen ion concentration (pH).

- a. *Applicability.* Reserved.
- b. *Maximum contaminant levels.* Reserved.
- c. *Monitoring requirements.* Reserved.
- d. *BAT.* Reserved.

e. *Analytical methodology.* Measurements for pH shall be conducted by a Grade II, III or IV operator meeting the requirements of 567—Chapter 81, any person under the supervision of a Grade II, III, or IV operator meeting the requirements of 567—Chapter 81, or a laboratory certified by the department to perform analysis under 567—Chapter 83. pH shall be determined in compliance with Method 4500-H⁺ (pH Value), pp. 4-65 to 4-69, as set forth in “Standard Methods,” 18th Edition.

567—41.8(455B) Radionuclides.

41.8(1) Radium-226, radium-228, and gross alpha particle radioactivity in community water systems. The following are the maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity:

a. Combined radium-226 and radium-228	<u>MCL</u> 5 pCi/l
b. Gross alpha particle activity (including radium-226 but excluding radon and uranium)	15 pCi/l

41.8(2) Beta particle and photon radioactivity from man-made radionuclides in community water systems.

a. The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year.

b. Except for the radionuclides listed in the table below, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents shall be calculated on the basis of a 2 liter per day drinking water intake using the 168-hour data listed in “Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure,” NBS Handbook 69 as amended August 1963, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 millirem/year.

TABLE — Average annual concentrations assumed to produce a total body or organ dose of 4 mrem/yr.

<u>Radionuclide</u>	<u>Critical Organ</u>	<u>pCi per liter</u>
Tritium	Total body	20,000
Strontium-90	Bone marrow	8

567—41.9(455B) Sampling and analytical requirements for turbidity and radionuclides.

41.9(1) Turbidity sampling and analytical requirements. The requirements in this subrule apply to public water supplies using surface water until June 29, 1993.

a. The requirements of this subrule shall apply only to public water supply systems which use water obtained in whole or in part from surface water sources.

b. A supplier of water serving a population or population equivalent of greater than 100,000 persons shall provide a continuous or rotating cycle turbidity monitoring and recording device or take hourly grab samples to determine compliance with 41.6(2)“*b.*”

c. For the purpose of making turbidity measurements to determine compliance with 41.6(2)“*b.*” samples shall be taken by the suppliers of water for both community water systems and noncommunity water systems at a representative entry point(s) to the water distribution system at least once per day, except under the following conditions:

(1) Systems required to be monitored under 41.9(1)“*b.*”; or

(2) Noncommunity systems, upon approval by the department, may be permitted to reduce their sampling frequency if they can demonstrate that no risk to health will result and they are maintaining a continuous chlorine residual as specified in 567—paragraph 43.7(2)“*a.*”

All turbidity measurements shall be made by the nephelometric method in accordance with the recommendations set forth in “Standard Methods,” pp. 132-134; or “Methods of Chemical Analysis of Water and Wastes,” EPA Environmental Monitoring and Support Laboratory, March 1979, Method 180.1-Nephelometric Method. Calibration of the turbidimeter shall be made either by the use of a formazin standard as specified in the cited reference or a styrene divinylbenzene polymer standard (Amco-AEPA-1 Polymer) commercially available from Amco Standards International, Inc., 230 Polaris Avenue, No. C, Mountain View, California 94043.

d. If the results (other than results monitored under 41.9(1)“*b.*” of a turbidity analysis) indicate that the maximum allowable limit has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour. If the repeat sample confirms that the maximum allowable limit has been exceeded, the supplier of water shall report to the department within 48 hours. The repeat sample shall be the sample used for the purpose of calculating the monthly average. If the monthly average of the daily samples exceeds the maximum allowable limit, or if the average of two samples taken on consecutive days exceeds 5 TU, the supplier of water shall report to the department and notify the public as directed in 41.10(2).

41.9(2) Analytical methods for radioactivity.

a. The methods specified in Interim Radiochemical Methodology for Drinking Water, Environmental Monitoring and Support Laboratory, EPA-600/4-75-008, USEPA, Cincinnati, Ohio 45268, or those listed below, are to be used to determine compliance with 41.8(1) and 41.8(2) (radioactivity) except in cases where alternative methods have been approved in accordance with 41.12(455B).

(1) Gross alpha and beta-Method 703, “Gross Alpha and Beta Radioactivity in Water,” “Standard Methods.”

(2) Total Radium-Method 705, “Radium in Water by Precipitation,” Ibid.

(3) Radium-226-Method 706, “Radium-226 by Radon in Water,” Ibid.

(4) Strontium-89-90, Method 704, “Total Strontium and Strontium-90 in Water,” Ibid.

(5) Tritium-Method 707, “Tritium in Water,” Ibid.

(6) Cesium-134 ASTM D-2459, “Gamma Spectrometry in Water,” 1975 Annual Book of ASTM Standards, Water and Atmospheric Analysis, Part 31, American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103 (1975).

(7) Uranium-ASTM D-2907, “Microquantities of Uranium in Water by Fluorometry,” Ibid.

b. When the identification and measurement of radionuclides other than those listed in 41.9(2) are required, the following references are to be used, except in cases where alternative methods have been approved in accordance with 41.12(455B).

(1) “Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions,” H. L. Krieger and S. Gold, EPA-R4-73-014, Environmental Protection Agency, Cincinnati, Ohio 45268 (May 1973).

(2) "HASL Procedure Manual," edited by John H. Harley. HASL 300, ERDA Health and Safety Laboratory, New York, NY (1973).

c. For the purpose of monitoring radioactivity concentration in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus 100 percent at the confidence level $(1.960 \{ \sigma \})$ where $0 \{ \sigma \}$ is the standard deviation of the net counting rate of the sample).

(1) To determine compliance with 41.8(1) "a," the detection limit shall not exceed 1 pCi/l. To determine compliance with 41.8(1) "b," the detection limit shall not exceed 3 pCi/l.

(2) To determine compliance with 41.8(2), the detection limits shall not exceed the concentrations listed in the table below.

TABLE — Detection Limits for Man-Made Beta Particle and Photon Emitters.

<u>Radionuclide</u>	<u>Detection Limit</u>
Tritium	1,000 pCi/l
Strontium-89	10 pCi/l
Strontium-90	2 pCi/l
Iodine-131	1 pCi/l
Cesium-134	10 pCi/l
Gross beta	4 pCi/l
Other radionuclides	1/10 of the applicable limit

d. To judge compliance with the maximum contaminant levels listed in 41.8(1) and 41.8(2), averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

41.9(3) *Monitoring frequency for radioactivity in community water systems.*

a. *Monitoring requirements for gross alpha particle activity, radium-226 and radium-228.*

(1) Initial sampling to determine compliance with 41.8(1) shall begin by June 24, 1979, and the analysis shall be completed by June 24, 1980. Compliance shall be based on the analysis of an annual composite of four consecutive quarterly samples or the average of the analyses of four samples obtained at quarterly intervals.

A gross alpha particle activity measurement may be substituted for the required radium-226 and radium-228 analysis, provided, that the measured gross alpha particle activity does not exceed 5 pCi/l at a confidence level of 95 percent $(1.65 \{ \sigma \})$ where $0 \{ \sigma \}$ is the standard deviation of the net counting rate of the sample). In localities where radium-228 may be present in drinking water, radium-226 or radium-228 analyses are required when the gross alpha particle activity exceeds 2 pCi/l.

When the gross alpha particle activity exceeds 5 pCi/l, the same or an equivalent sample shall be analyzed for radium-226. If the concentration of radium-226 exceeds 3 pCi/l the same or an equivalent sample shall be analyzed for radium-228.

(2) For the initial analysis required by 41.9(3) "a" (1), data acquired on or after June 24, 1976, may be substituted at the discretion of the department.

(3) Suppliers of water shall monitor at least once every four years following the procedure required by 41.9(3) "a" (1). At the discretion of the department, when an annual record taken in conformance with 41.9(3) "a" (1) has established that the average annual concentration is less than half the maximum contaminant levels established by 41.8(1), analysis of a single sample may be substituted for the quarterly sampling procedure required by 41.9(3) "a" (1).

More frequent monitoring shall be conducted when requested by the department in the vicinity of mining or other operations which may contribute alpha particle radioactivity to either surface or groundwater sources of drinking water.

A supplier of water shall monitor in conformance with 41.9(3) "a" (1) within one year of the introduction of a new water source for a community water system. More frequent monitoring shall be conducted when requested by the department in the event of possible contamination or when changes

in the distribution system or treatment processing occur which may increase the concentration of radioactivity in finished water.

A community water system using two or more sources having different concentrations of radioactivity shall monitor source water, in addition to water from a free-flowing tap, when requested by the department.

Monitoring for compliance with 41.8(1) after the initial period need not include radium-228 except when required by the department, provided, that the average annual concentration of radium-228 has been assayed at least once using the quarterly sampling procedure required by 41.9(3)“a”(1).

Suppliers of water shall conduct annual monitoring of any community water system in which the radium-226 concentration exceeds 3 pCi/l, when requested by the department.

(4) If the average annual maximum contaminant level for gross alpha particle activity or total radium as set forth in 41.8(1) is exceeded, the supplier of a community water system shall notify the public as required by 41.10(2). Monitoring at quarterly intervals shall be continued until the annual average concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition of an operation permit or enforcement action shall become effective.

b. Monitoring requirements for man-made radioactivity in community water systems.

(1) Systems using surface water sources and serving more than 100,000 persons and such other community water systems as are designated by the department shall be monitored for compliance with 41.8(2) by analysis of a composite of four consecutive quarterly samples. Compliance with 41.8(2) may be assumed without further analysis if the average annual concentration of gross beta particle activity is less than 50 pCi/l and if the average annual concentrations of tritium and strontium-90 are less than those listed in the detection limits table, provided, that if both radionuclides are present, the sum of their annual dose equivalents to bone marrow shall not exceed 4 millirem/year.

If the gross beta particle activity exceeds 50 pCi/l, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with 41.8(2).

Suppliers of water shall conduct additional monitoring, as requested by the department, to determine the concentration of man-made radioactivity in principal watersheds designated by the department.

At the discretion of the department, suppliers of water utilizing only groundwaters may be required to monitor for man-made radioactivity.

(2) For the initial analysis required by 41.9(3)“b”(1), data acquired on or after June 24, 1976, may be substituted at the discretion of the department.

(3) After the initial analysis required by 41.9(3)“b”(1) suppliers of water shall monitor at least every four years following the procedure given in 41.9(3)“b”(2).

(4) The supplier of any community water system designated by the department as utilizing water contaminated by effluents from nuclear facilities shall initiate quarterly monitoring for gross beta particle and iodine-131 radioactivity and annual monitoring for strontium-90 and tritium.

Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three monthly samples. The former is recommended. If the gross beta particle activity in a sample exceeds 15 pCi/l, the same or an equivalent sample shall be analyzed for strontium-89 and cesium-134. If the gross beta particle activity exceeds 50 pCi/l, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with 41.8(2).

For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As requested by the department, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.

Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. The latter procedure is recommended.

The department may allow the substitution of environmental surveillance data taken in conjunction with a nuclear facility for direct monitoring of man-made radioactivity by the supplier of water where the department determines such data is applicable to a particular community water system.

(5) If the average annual maximum contaminant level for man-made radioactivity set forth in 41.8(2) is exceeded, the operator of a community water system shall give notice to the public as required by 41.10(2). Monitoring at monthly intervals shall be continued until the concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition of an operation permit or enforcement action becomes effective.

567—41.10(455B) Reporting, public notification and record keeping.

41.10(1) Reporting requirements other than lead and copper.

a. When required by the department, the supplier of water shall report to the department within ten days following a test, measurement or analysis required to be made by this chapter, the results of that test, measurement or analysis in the form and manner prescribed by the department. This shall include reporting of all positive detects within the same specific analytical series.

b. Except where a different reporting period is specified in this subrule, the supplier of water shall report to the department, within 48 hours after any failure to comply with the monitoring requirements set forth in this rule. The supplier of water shall also notify the department within 48 hours of failure to comply with any primary drinking water regulations.

c. The public water supply system, within ten days of completion of each public notification required pursuant to subrule 41.10(2), shall submit to the department a representative copy of each type of notice distributed, published, posted, or made available to the persons served by the system or to the media.

41.10(2) Public notification requirements. (Acute violations must follow public notification provisions of both 41.10(2)“a”(1) and (2). Routine violations must follow provisions of 41.10(2)“a”(1) only.)

a. *Maximum contaminant level (MCL), treatment technique and compliance schedule violations.* The owner or operator of a public water supply system which fails to comply with an applicable MCL established by 41.2(455B) through 41.8(455B), treatment technique established by 567—subrule 43.3(10) or which fails to comply with the requirements of any compliance schedule prescribed pursuant to 567—subrule 43.2(5), shall notify persons served by the system as follows:

(1) By publication in a daily newspaper of general circulation in the area served by the system as soon as possible, but in no case later than 14 days after the violation or failure, and by mail delivery (by direct mail, with the water bill, or by hand delivery) not later than 45 days after the violation or failure. The department may waive mail delivery if it determines that the owner or operator of the public water system in violation has corrected the violation or failure within the 45-day period. The department must make the waiver in writing and within the 45-day period.

If the area served by a public water supply system is not served by a daily newspaper of general circulation, notice shall instead be given by publication in a weekly newspaper of general circulation serving the area and by mail delivery.

(2) For violations of the MCLs of contaminants that may pose an acute risk to human health, the owner or operator of a public water supply system shall, as soon as possible but in no case later than 72 hours after the violation, furnish a copy of the notice to the radio and television stations serving the area served by the public water system in addition to meeting the requirements of 41.10(2)“a”(1). The following violations are acute violations:

1. Any violations specified by the department as posing an acute risk to human health.
2. Violation of the MCL for nitrate, nitrite, or combined nitrate and nitrite as established in 41.3(1)“b” and determined according to 41.3(1)“c.”
3. Violation of the MCL for total coliforms, when fecal coliforms or *E. coli* are present in the water distribution system, as specified in 41.2(1)“b”(2).

4. Occurrence of a waterborne disease outbreak, as defined in 567—40.2 (455B), in an unfiltered system subject to the requirements of 567—43.5(455B).

(3) Following the initial notice given under 41.10(2) “a”(1) and (2), the owner or operator of the public water supply system must give notice at least once every three months by mail delivery (by direct mail, with the water bill, or by hand delivery), for as long as the violation or failure exists.

(4) The owner or operator of a community water system in an area that is not served by a daily or weekly newspaper of general circulation must, in lieu of the requirements of 41.10(2) “a”(1), (2), and (3), give notice within 14 days (72 hours for an acute violation) after the violation or failure by hand delivery or by continuous posting in conspicuous places within the area served by the system. Hand delivery must be repeated every three months or posting must continue for as long as the violation or failure exists.

(5) The owner or operator of a noncommunity water system may, in lieu of the requirements of 41.10(2) “a”(1), (2) and (3), give notice within 14 days (72 hours for an acute violation) after the violation or failure by hand delivery or by continuous posting in conspicuous places within the area served by the system. Hand delivery must be repeated every three months or posting must continue for as long as the violation or failure exists.

b. Other violations. The owner or operator of a public water supply system which fails to perform monitoring required by 41.2(455B) through 41.9(455B), or fails to comply with a testing procedure established in 41.2(455B) through 41.9(455B), is subject to an interim contaminant level or compliance schedule, or an unregulated contaminant is detected and the department advises that public notification is necessary, shall notify persons served by the system within three months by the methods described in 41.10(2) “a”(1), by newspaper only, or by applicable methods described in 41.10(2) “a”(4) or (5). Notice must continue by methods described in 41.10(2) “a” for as long as the violation exists, an interim contaminant level or compliance schedule remains in effect or the unregulated contaminant is detected.

c. Notice of available information. The owner or operator of a public water supply system shall notify persons served by the system of the availability of the results of sampling conducted for synthetic organic chemicals, under 41.11(1) “b” and “c,” by including a notice in the first set of water bills issued by the system after the receipt of the results or written notice within three months. For surface water supply systems, public notification is required only after the first quarter’s monitoring and must include a statement that additional monitoring will be conducted for three or more quarters with the results available upon request. The owner or operator shall also provide to all new billing units or new hookups, prior to or at the time service begins, a copy of the most recent public notice for any outstanding violation of any maximum contaminant level established by 41.2(455B) through 41.8(455B), results of sampling conducted under 41.11(1) “b” and “c,” any notice of a treatment technique requirement established by 567—subrule 43.2(5) and notice of any failure to comply with the requirements of any schedule prescribed pursuant to 567—subrule 43.2(5). The notice shall provide a person and telephone number to contact for information.

d. General content of public notice. Each notice required by this subrule must provide a clear and readily understandable explanation of the violation, any potential adverse health effects, the population at risk, the steps that the public water system is taking to correct the violation, the necessity for seeking alternative water supplies, if any, and any preventive measures the consumer should take until the violation is corrected. Each notice shall be conspicuous and shall not contain unduly technical language, unduly small print, or similar problems that frustrate the purpose of the notice. Each notice shall include the telephone number of the owner, operator, or designee of the public water supply system as a source of additional information concerning the notice. Where appropriate, the notice shall be multilingual.

e. Mandatory health effects language. When providing the information on potential adverse health effects required by 41.10(2) “d” in notices of violations of maximum contaminant levels or treatment technique requirements, or notices of the granting or the continued existence of interim contaminant levels or compliance schedules, or notices of failure to comply with an interim contaminant level or compliance schedule, the owner or operator of the public water system shall include the lan-

guage specified below for each contaminant. (If language for a particular contaminant is not specified below at the time notice is required, this paragraph does not apply.)

(1) Benzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that benzene is a health concern at certain levels of exposure. This chemical is used as a solvent and degreaser of metals. It is also a major component of gasoline. Drinking water contamination generally results from leaking underground gasoline and petroleum tanks or improper waste disposal. This chemical has been associated with significantly increased risks of leukemia among certain industrial workers who were exposed to relatively large amounts of this chemical during their working careers. This chemical has also been shown to cause cancer in laboratory animals when the animals are exposed at high levels over their lifetimes. Chemicals that cause increased risk of cancer among exposed industrial workers and in laboratory animals also may increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for benzene at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in humans and laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(2) Carbon tetrachloride. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that carbon tetrachloride is a health concern at certain levels of exposure. This chemical was once a popular household cleaning fluid. It generally gets into drinking water by improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for carbon tetrachloride at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(3) 1,2-Dichloroethane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 1,2-dichloroethane is a health concern at certain levels of exposure. This chemical is used as a cleaning fluid for fats, oils, waxes, and resins. It generally gets into drinking water from improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for 1,2-dichloroethane at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(4) 1,1-Dichloroethylene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 1,1-dichloroethylene is a health concern at certain levels of exposure. This chemical is used in industry and is found in drinking water as a result of the breakdown of related solvents. The solvents are used as cleaners and degreasers of metals and generally get into drinking water by improper waste disposal. This chemical has been shown to cause liver and kidney damage in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals which cause adverse effects in laboratory animals also may cause adverse health effects in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for 1,1-dichloroethylene at 0.007 parts per million (ppm) to reduce the risk of these adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(5) Fluoride. The U.S. Environmental Protection Agency requires that we send you this notice on the level of fluoride in your drinking water. The drinking water in your community has a fluoride concentration of — — — (the public water supply shall insert the compliance result which triggered notification under this subrule) milligrams per liter (mg/l).

Federal regulations require that fluoride, which occurs naturally in your water supply, not exceed a concentration of 4.0 mg/l in drinking water. This is an enforceable standard called a Maximum Contaminant Level (MCL), and it has been established to protect the public health. Exposure to drinking water levels above 4.0 mg/l for many years may result in some cases of crippling skeletal fluorosis, which is a serious bone disorder.

Federal law also requires that we notify you when monitoring indicates that the fluoride in your drinking water exceeds 2.0 mg/l. This is intended to alert families about dental problems that might affect children under nine years of age. The fluoride concentration of your water exceeds this federal guideline.

Fluoride in children's drinking water at levels of approximately 1 mg/l reduces the number of dental cavities. However, some children exposed to levels of fluoride greater than about 2.0 mg/l may develop dental fluorosis. Dental fluorosis, in its moderate and severe forms, is a brown staining or pitting of the permanent teeth.

Because dental fluorosis occurs only when developing teeth (before they erupt from the gums) are exposed to elevated fluoride levels, households without children are not expected to be affected by this level of fluoride. Families with children under the age of nine are encouraged to seek other sources of drinking water for their children to avoid the possibility of staining and pitting.

Your water supplier can lower the concentration of fluoride in your water so that you will still receive the benefits of cavity prevention while the possibility of stained and pitted teeth is minimized. Removal of fluoride may increase your water costs. Treatment systems are also commercially available for home use. Information on such systems is available at the address given below. Low fluoride bottled drinking water that would meet all standards is also commercially available.

For further information, contact — — — (the public water supply shall insert the name, address, and telephone number of a contact person at the public water system) at your water system.

(6) Para-dichlorobenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that para-dichlorobenzene is a health concern at certain levels of exposure. This chemical is a component of deodorizers, mothballs, and pesticides. It generally gets into drinking water by improper waste disposal. This chemical has been shown to cause liver and kidney damage in laboratory animals such as rats and mice when the animals are exposed to high levels over their lifetimes. Chemicals which cause adverse effects in laboratory animals also may cause adverse health effects in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for para-dichlorobenzene at 0.075 parts per million (ppm) to reduce the risk of these adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(7) 1,1,1-Trichloroethane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 1,1,1-trichloroethane is a health concern at certain levels of exposure. This chemical is used as a cleaner and degreaser of metals. It generally gets into drinking water by improper waste disposal. This chemical has been shown to damage the liver, nervous system, and circulatory system of laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Some industrial workers who were exposed to relatively large amounts of this chemical during their working careers also suffered damage to the liver, nervous system, and circulatory system. Chemicals which cause adverse effects among exposed industrial workers and in laboratory animals also may cause adverse health effects in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for 1,1,1-trichloroethane at 0.2 parts per million (ppm) to protect against the risk of these adverse health effects which have been observed in humans and laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(8) Trichloroethylene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that trichloroethylene is a health concern at certain levels of exposure. This chemical is a common metal-cleaning and dry-cleaning fluid. It generally gets into drinking water by improper waste disposal. This chemical has been shown to cause cancer in laboratory animals

such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set forth the enforceable drinking water standard for trichloroethylene at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(9) Vinyl chloride. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that vinyl chloride is a health concern at certain levels of exposure. This chemical is used in industry and is found in drinking water as a result of the breakdown of related solvents. The solvents are used as cleaners and degreasers of metals and generally get into drinking water by improper waste disposal. This chemical has been associated with significantly increased risks of cancer among certain industrial workers who were exposed to relatively large amounts of this chemical during their working careers. This chemical has also been shown to cause cancer in laboratory animals when the animals are exposed at high levels over their lifetimes. Chemicals that cause increased risk of cancer among exposed industrial workers and in laboratory animals also may increase the risk of cancer in humans who are exposed at lower levels over long periods of time. EPA has set the enforceable drinking water standard for vinyl chloride at 0.002 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in humans and laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe.

(10) Microbiological contaminants (for use when there is a violation of the treatment technique requirements for filtration and disinfection in 567—43.5(455B)). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of microbiological contaminants is a health concern at certain levels of exposure. If water is inadequately treated, microbiological contaminants in that water may cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than drinking water. EPA has set enforceable requirements for treating drinking water to reduce the risk of these adverse health effects. Treatment such as filtering and disinfecting the water removes or destroys microbiological contaminants. Drinking water which is treated to meet EPA requirements is associated with little or no risk and should be considered safe.

(11) Total coliforms (to be used when there is a violation of 41.2(1)“b”(1) and not a violation of 41.2(1)“b”(2). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of total coliforms is a possible health concern. Total coliforms are common in the environment and are generally not harmful themselves. The presence of these bacteria in drinking water, however, generally is a result of a problem with water treatment or the pipes which distribute the water and indicates that the water may be contaminated with organisms that can cause disease.

Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water but also may be caused by a number of factors other than the drinking water. EPA has set an enforceable drinking water standard for total coliforms to reduce the risk of these adverse health effects. Under this standard, no more than 5.0 percent of the samples collected during a month can contain these bacteria, except that systems collecting fewer than 40 samples per month that have one total coliform-positive sample per month are not violating the standard. Drinking water which meets this standard is usually not associated with a health risk from disease-causing bacteria and should be considered safe.

(12) Fecal coliforms/*E. coli* (to be used when there is a violation of 41.2(1)“b”(2) or both 41.2(1)“b”(1) and (2). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of fecal coliforms or *E. coli* is a serious health concern. Fecal coliforms and *E. coli* are generally not harmful themselves, but their presence in drinking water

is serious because they usually are associated with sewage or animal wastes. The presence of these bacteria in drinking water is generally a result of a problem with water treatment or the pipes which distribute the water and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, nausea, and possibly jaundice, and associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than the drinking water. EPA has set an enforceable drinking water standard for fecal coliforms and *E. coli* to reduce the risk of these adverse health effects. Under this standard all drinking water samples must be free of these bacteria. Drinking water which meets this standard is associated with little or none of this risk and should be considered safe. State and local health authorities recommend that consumers take the following precautions: (to be inserted by the public water supply system, according to instructions from state or local authorities).

(13) Lead. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that lead is a health concern at certain exposure levels. Materials that contain lead have frequently been used in the construction of water supply distribution systems, and plumbing systems in private homes and other buildings. The most commonly found materials include service lines, pipes, brass and bronze fixtures, and solders and fluxes. Lead in these materials can contaminate drinking water as a result of the corrosion that takes place when water comes into contact with those materials. Lead can cause a variety of adverse health effects in humans. At relatively low levels of exposure, these effects may include interference with red blood cell chemistry, delays in normal physical and mental development in babies and young children, slight deficits in the attention span, hearing, and learning abilities of children, and slight increases in the blood pressure of some adults. EPA's national primary drinking water regulation requires all public water systems to optimize corrosion control to minimize lead contamination resulting from the corrosion of plumbing materials. Public water systems serving 50,000 people or fewer that have lead concentrations below 15 parts per billion (ppb) in more than 90 percent of tap water samples (the EPA "action level") have optimized their corrosion control treatment. Any water system that exceeds the action level must also monitor its source water to determine whether treatment to remove lead in source water is needed. Any water system that continues to exceed the action level after installation of corrosion control or source water treatment must eventually replace all lead service lines contributing in excess of 15 ppb of lead to drinking water. Any water system that exceeds the action level must also undertake a public education program to inform consumers of ways they can reduce their exposure to potentially high levels of lead in drinking water.

(14) Copper. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that copper is a health concern at certain exposure levels. Copper, a reddish-brown metal, is often used to plumb residential and commercial structures that are connected to water distribution systems. Copper contaminating drinking water as a corrosion by-product occurs as the result of the corrosion of copper pipes that remain in contact with water for a prolonged period of time. Copper is an essential nutrient, but at high doses it has been shown to cause stomach and intestinal distress, liver and kidney damage, and anemia. Persons with Wilson's disease may be at a higher risk of health effects due to copper than the general public. EPA's national primary drinking water regulation requires all public water systems to install optimal corrosion control to minimize copper contamination resulting from the corrosion of plumbing materials. Public water systems serving 50,000 people or fewer that have copper concentrations below 1.3 parts per million (ppm) in more than 90 percent of tap water samples (the EPA "action level") are not required to install or improve their treatment. Any water system that exceeds the action level must also monitor their source water to determine whether treatment to remove copper in source water is needed.

(15) Asbestos. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that asbestos fibers greater than 10 micrometers in length are a health concern at certain levels of exposure. Asbestos is a naturally occurring mineral. Most asbestos fibers in drinking water are less than 10 micrometers in length and occur in drinking water from natural sources and from corroded asbestos-cement pipes in the distribution system. The major uses of asbestos were in the production of cements, floor tiles, paper products, paint, and caulking; in transportation-

related applications; and in the production of textiles and plastics. Asbestos was once a popular insulating and fire-retardant material. Inhalation studies have shown that various forms of asbestos have produced lung tumors in laboratory animals. The available information on the risk of developing gastrointestinal tract cancer associated with the ingestion of asbestos from drinking water is limited. Ingestion of intermediate-range chrysotile asbestos fibers greater than 10 micrometers in length is associated with causing benign tumors in male rats. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for asbestos at 7 million long fibers per liter to reduce the potential risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to asbestos.

(16) Barium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that barium is a health concern at certain levels of exposure. This inorganic chemical occurs naturally in some aquifers that serve as sources of groundwater. It is also used in oil and gas drilling muds, automotive paints, bricks, tiles and jet fuels. It generally gets into drinking water after dissolving from naturally occurring minerals in the ground. This chemical may damage the heart and cardiovascular system and is associated with high blood pressure in laboratory animals such as rats exposed to high levels during their lifetimes. In humans, EPA believes that effects from barium on blood pressure should not occur below 2 parts per million (ppm) in drinking water. EPA has set the drinking water standard for barium at 2 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to barium.

(17) Cadmium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that cadmium is a health concern at certain levels of exposure. Food and the smoking of tobacco are common sources of general exposure. This inorganic metal is a contaminant in the metals used to galvanize pipe. It generally gets into water by corrosion of galvanized pipes or by improper waste disposal. This chemical has been shown to damage the kidneys in animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Some industrial workers who were exposed to relatively large amounts of this chemical during working careers also suffered damage to the kidneys. EPA has set the drinking water standard for cadmium at 0.005 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to cadmium.

(18) Chromium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that chromium is a health concern at certain levels of exposure. This inorganic metal occurs naturally in the ground and is often used in the electroplating of metals. It generally gets into water from runoff from old mining operations and improper waste disposal from plating operations. This chemical has been shown to damage the kidneys, nervous system, and the circulatory system of laboratory animals such as rats and mice when the animals are exposed at high levels. Some humans who were exposed to high levels of this chemical suffered liver and kidney damage, dermatitis and respiratory problems. EPA has set the drinking water standard for chromium at 0.1 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to chromium.

(19) Mercury. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that mercury is a health concern at certain levels of exposure. This inorganic metal is used in electrical equipment and some water pumps. It usually gets into water as a result of improper waste disposal. This chemical has been shown to damage the kidneys of laboratory animals such as rats when the animals are exposed at high levels over their lifetimes. EPA has set the drinking water standard for mercury at 0.002 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to mercury.

(20) Nitrate. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that nitrate poses an acute health concern at certain levels of exposure. Nitrate is used in fertilizer and is found in sewage and wastes from humans or farm animals and generally gets into drinking water from those activities. Excessive levels of nitrate in drinking water have caused serious illness and sometimes death in infants under six months of age. The serious illness in infants is caused because nitrate is converted to nitrite in the body. Nitrite interferes with the oxygen carrying capacity of the child's blood. This is an acute disease in that symptoms can develop rapidly in infants. In most cases, health deteriorates over a period of days. Symptoms include shortness of breath and blueness of the skin. Clearly, expert medical advice should be sought immediately if these symptoms occur. The purpose of this notice is to encourage parents and other responsible parties to provide infants with an alternate source of drinking water. Local and state health authorities are the best source for information concerning alternate sources of drinking water for infants. EPA has set the drinking water standard at 10 parts per million (ppm) for nitrate to protect against the risk of these adverse effects. EPA has also set a drinking water standard for nitrite at 1 ppm. To allow for the fact that the toxicity of nitrate and nitrite are additive, EPA has also established a standard for the sum of nitrate and nitrite at 10 ppm. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to nitrate.

(21) Nitrite. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that nitrite poses an acute health concern at certain levels of exposure. This inorganic chemical is used in fertilizers and is found in sewage and wastes from humans or farm animals and generally gets into drinking water as a result of those activities. While excessive levels of nitrite in drinking water have not been observed, other sources of nitrite have caused serious illness and sometimes death in infants under six months of age. The serious illness in infants is caused because nitrite interferes with the oxygen carrying capacity of the child's blood. This is an acute disease in that symptoms can develop rapidly. However, in most cases, health deteriorates over a period of days. Symptoms include shortness of breath and blueness of the skin. Clearly, expert medical advice should be sought immediately if these symptoms occur. The purpose of this notice is to encourage parents and other responsible parties to provide infants with an alternate source of drinking water. Local and state health authorities are the best source for information concerning alternate sources of drinking water for infants. EPA has set the drinking water standard at 1 part per million (ppm) for nitrite to protect against the risk of these adverse effects. EPA has also set a drinking water standard for nitrate (converted to nitrite in humans) at 10 ppm and for the sum of nitrate and nitrite at 10 ppm. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to nitrite.

(22) Selenium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that selenium is a health concern at certain high levels of exposure. Selenium is also an essential nutrient at low levels of exposure. This inorganic chemical is found naturally in food and soils and is used in electronics, photocopy operations, the manufacture of glass, chemicals, drugs, and as a fungicide and a feed additive. In humans, exposure to high levels of selenium over a long period of time has resulted in a number of adverse health effects, including a loss of feeling and control in the arms and legs. EPA has set the drinking water standard for selenium at 0.05 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to selenium.

(23) Acrylamide. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that acrylamide is a health concern at certain levels of exposure. Polymers made from acrylamide are sometimes used to treat water supplies to remove particulate contaminants. Acrylamide has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. Sufficiently large doses of acrylamide are known to cause neurological injury. EPA has set the drinking water standard for acrylamide using a treatment technique to reduce the risk of cancer or other ad-

verse health effects which have been observed in laboratory animals. This treatment technique limits the amount of acrylamide in the polymer and the amount of the polymer which may be added to drinking water to remove particulates. Drinking water systems which comply with this treatment technique have little to no risk and are considered safe with respect to acrylamide.

(24) Alachlor. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that alachlor is a health concern at certain levels of exposure. This organic chemical is a widely used pesticide. When soil and climatic conditions are favorable, alachlor may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for alachlor at 0.002 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to alachlor.

(25) Aldicarb. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that aldicarb is a health concern at certain levels of exposure. Aldicarb is a widely used pesticide. Under certain soil and climatic conditions (e.g., sandy soil and high rainfall), aldicarb may leach into groundwater after normal agricultural applications to crops such as potatoes or peanuts or may enter drinking water supplies as a result of surface runoff. This chemical has been shown to damage the nervous system in laboratory animals such as rats and dogs exposed to high levels. EPA has set the drinking water standard for aldicarb at 0.003 parts per million (ppm) to protect against the risk of adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to aldicarb.

(26) Aldicarb sulfoxide. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that aldicarb sulfoxide is a health concern at certain levels of exposure. Aldicarb is a widely used pesticide. Aldicarb sulfoxide in groundwater is primarily a breakdown product of aldicarb. Under certain soil and climatic conditions (e.g., sandy soil and high rainfall), aldicarb sulfoxide may leach into groundwater after normal agricultural applications to crops such as potatoes or peanuts or may enter drinking water supplies as a result of surface runoff. This chemical has been shown to damage the nervous system in laboratory animals such as rats and dogs exposed to high levels. EPA has set the drinking water standard for aldicarb sulfoxide at 0.004 parts per million (ppm) to protect against the risk of adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to aldicarb sulfoxide.

(27) Aldicarb sulfone. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that aldicarb sulfone is a health concern at certain levels of exposure. Aldicarb is a widely used pesticide. Aldicarb sulfone is formed from the breakdown of aldicarb and is considered for registration as a pesticide under the name aldoxycarb. Under certain soil and climatic conditions (e.g., sandy soil and high rainfall), aldicarb sulfone may leach into groundwater after normal agricultural applications to crops such as potatoes or peanuts or may enter drinking water supplies as a result of surface runoff. This chemical has been shown to damage the nervous system in laboratory animals such as rats and dogs exposed to high levels. EPA has set the drinking water standard for aldicarb sulfone at 0.002 parts per million (ppm) to protect against the risk of adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to aldicarb sulfone.

(28) Atrazine. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that atrazine is a health concern at certain levels of exposure. This organic chemical is an herbicide. When soil and climatic conditions are favorable, atrazine may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to affect offspring of rats and the hearts of dogs. EPA has set the drinking water standard for atrazine at 0.003 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to atrazine.

(29) Carbofuran. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that carbofuran is a health concern at certain levels of exposure. This organic chemical is a pesticide. When soil and climatic conditions are favorable, carbofuran may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to damage the nervous and reproductive systems of laboratory animals such as rats and mice exposed at high levels over their lifetimes. Some humans who were exposed to relatively large amounts of this chemical during their working careers also suffered damage to the nervous system. Effects on the nervous system are generally rapidly reversible. EPA has set the drinking water standard for carbofuran at 0.04 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to carbofuran.

(30) Chlordane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that chlordane is a health concern at certain levels of exposure. This organic chemical is a pesticide used to control termites. Chlordane is not very mobile in soils. It usually gets into drinking water after application near water supply intakes or wells. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for chlordane at 0.002 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to chlordane.

(31) Dibromochloropropane (DBCP). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that DBCP is a health concern at certain levels of exposure. This organic chemical was once a popular pesticide. When soil and climatic conditions are favorable, dibromochloropropane may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for DBCP at 0.0002 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to DBCP.

(32) o-Dichlorobenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that o-dichlorobenzene is a health concern at certain levels of exposure. This organic chemical is used as a solvent in the production of pesticides and dyes. It generally gets into water by improper waste disposal. This chemical has been shown to damage the liver, kidneys and the blood cells of laboratory animals such as rats and mice exposed to high levels during their lifetimes. Some industrial workers who were exposed to relatively large amounts of this chemical during working careers also suffered damage to the liver, nervous system, and circulatory system. EPA has set the drinking water standard for o-dichlorobenzene at 0.6 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to o-dichlorobenzene.

(33) cis-1,2-Dichloroethylene. The United States Environmental Protection Agency (EPA) establishes drinking water standards and has determined that cis-1,2-dichloroethylene is a health concern at certain levels of exposure. This organic chemical is used as a solvent and intermediate in chemical production. It generally gets into water by improper waste disposal. This chemical has been shown to damage the liver, nervous system, and circulatory system of laboratory animals such as rats and mice when exposed at high levels over their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the nervous system. EPA has set the drinking water standard for cis-1,2-dichloroethylene at 0.07 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to cis-1,2-dichloroethylene.

(34) trans-1,2-Dichloroethylene. The United States Environmental Protection Agency (EPA) establishes drinking water standards and has determined that trans-1,2-dichloroethylene is a health concern at certain levels of exposure. This organic chemical is used as a solvent and intermediate in chemical production. It generally gets into water by improper waste disposal. This chemical has been shown to damage the liver, nervous system, and the circulatory system of laboratory animals such as rats and mice when exposed at high levels over their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the nervous system. EPA has set the drinking water standard for trans-1,2-dichloroethylene at 0.1 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to trans-1,2-dichloroethylene.

(35) 1,2-Dichloropropane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 1,2-dichloropropane is a health concern at certain levels of exposure. This organic chemical is used as a solvent and pesticide. When soil and climatic conditions are favorable, 1,2-dichloropropane may get into drinking water by runoff into surface water or by leaching into groundwater. It may also get into drinking water through improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for 1,2-dichloropropane at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to 1,2-dichloropropane.

(36) 2,4-D. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 2,4-D is a health concern at certain levels of exposure. This organic chemical is used as an herbicide and to control algae in reservoirs. When soil and climatic conditions are favorable, 2,4-D may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to damage the liver and kidneys of laboratory animals such as rats exposed at high levels during their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the nervous system. EPA has set the drinking water standard for 2,4-D at 0.07 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to 2,4-D.

(37) Epichlorohydrin. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that epichlorohydrin is a health concern at certain levels of exposure. Polymers made from epichlorohydrin are sometimes used in the treatment of water supplies as a flocculant to remove particulates. Epichlorohydrin generally gets into drinking water by improper use of these polymers. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for epichlorohydrin using a treatment technique to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. This treatment technique limits the amount of epichlorohydrin in the polymer and the amount of the polymer which may be added to drinking water as a flocculant to remove particulates. Drinking water systems which comply with this treatment technique have little to no risk and are considered safe with respect to epichlorohydrin.

(38) Ethylbenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined ethylbenzene is a health concern at certain levels of exposure. This organic chemical is a major component of gasoline. It generally gets into water by improper waste disposal or leaking gasoline tanks. This chemical has been shown to damage the kidneys, liver, and nervous system of laboratory animals such as rats exposed to high levels during their lifetimes. EPA has set the drinking water standard for ethylbenzene at 0.7 parts per million (ppm) to protect against the

risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to ethylbenzene.

(39) Ethylene dibromide (EDB). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that EDB is a health concern at certain levels of exposure. This organic chemical was once a popular pesticide. When soil and climatic conditions are favorable, EDB may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for EDB at 0.00005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to EDB.

(40) Heptachlor. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that heptachlor is a health concern at certain levels of exposure. This organic chemical was once a popular pesticide. When soil and climatic conditions are favorable, heptachlor may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standards for heptachlor at 0.0004 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to heptachlor.

(41) Heptachlor epoxide. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that heptachlor epoxide is a health concern at certain levels of exposure. This organic chemical was once a popular pesticide. When soil and climatic conditions are favorable, heptachlor epoxide may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standards for heptachlor epoxide at 0.0002 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to heptachlor epoxide.

(42) Lindane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that lindane is a health concern at certain levels of exposure. This organic chemical is used as a pesticide. When soil and climatic conditions are favorable, lindane may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to damage the liver, kidneys, nervous system, and immune system of laboratory animals such as rats, mice and dogs exposed at high levels during their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the nervous system and circulatory system. EPA has established the drinking water standard for lindane at 0.0002 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to lindane.

(43) Methoxychlor. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that methoxychlor is a health concern at certain levels of exposure. This organic chemical is used as a pesticide. When soil and climatic conditions are favorable, methoxychlor may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to damage the liver, kidneys, nervous system, and reproductive system of laboratory animals such as rats exposed at high levels during their lifetimes. It has also been shown to produce growth retardation in rats. EPA has set the drinking water standard for methoxychlor at 0.04 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that

meets the EPA standard is associated with little to none of this risk and is considered safe with respect to methoxychlor.

(44) Monochlorobenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that monochlorobenzene is a health concern at certain levels of exposure. This organic chemical is used as a solvent. It generally gets into water by improper waste disposal. This chemical has been shown to damage the liver, kidneys and nervous system of laboratory animals such as rats and mice exposed to high levels during their lifetimes. EPA has set the drinking water standard for monochlorobenzene at 0.1 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to monochlorobenzene.

(45) Polychlorinated biphenyls (PCBs). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that polychlorinated biphenyls (PCBs) are a health concern at certain levels of exposure. These organic chemicals were once widely used in electrical transformers and other industrial equipment. They generally get into drinking water by improper waste disposal or leaking electrical industrial equipment. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for PCBs at 0.0005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to PCBs.

(46) Pentachlorophenol. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that pentachlorophenol is a health concern at certain levels of exposure. This organic chemical is used as a wood preservative, herbicide, disinfectant, and defoliant. It generally gets into drinking water by runoff into surface water or leaching into groundwater. This chemical has been shown to produce adverse reproductive effects and to damage the liver and kidneys of laboratory animals such as rats exposed to high levels during their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the liver and kidneys. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for pentachlorophenol at 0.001 parts per million (ppm) to protect against the risk of cancer or other adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to pentachlorophenol.

(47) Styrene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that styrene is a health concern at certain levels of exposure. This organic chemical is commonly used to make plastics and is sometimes a component of resins used for drinking water treatment. Styrene may get into drinking water from improper waste disposal. This chemical has been shown to damage the liver and nervous system in laboratory animals when exposed at high levels during their lifetimes. EPA has set the drinking water standard for styrene at 0.1 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to styrene.

(48) Tetrachloroethylene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that tetrachloroethylene is a health concern at certain levels of exposure. This organic chemical has been a popular solvent, particularly for dry cleaning. It generally gets into drinking water by improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for tetrachloroethylene at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects

which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to tetrachloroethylene.

(49) Toluene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that toluene is a health concern at certain levels of exposure. This organic chemical is used as a solvent and in the manufacture of gasoline for airplanes. It generally gets into water by improper waste disposal or leaking underground storage tanks. This chemical has been shown to damage the kidneys, nervous system, and circulatory system of laboratory animals such as rats and mice exposed to high levels during their lifetimes. Some industrial workers who were exposed to relatively large amounts of this chemical during working careers also suffered damage to the liver, kidneys and nervous system. EPA has set the drinking water standard for toluene at 1 part per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to toluene.

(50) Toxaphene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that toxaphene is a health concern at certain levels of exposure. This organic chemical was once a pesticide widely used on cotton, corn, soybeans, pineapples and other crops. When soil and climatic conditions are favorable, toxaphene may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for toxaphene at 0.003 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water that meets this standard is associated with little to none of this risk and is considered safe with respect to toxaphene.

(51) 2,4,5-TP. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 2,4,5-TP is a health concern at certain levels of exposure. This organic chemical is used as an herbicide. When soil and climatic conditions are favorable, 2,4,5-TP may get into drinking water by runoff into surface water or by leaching into groundwater. This chemical has been shown to damage the liver and kidneys of laboratory animals such as rats and dogs exposed to high levels during their lifetimes. Some industrial workers who were exposed to relatively large amounts of this chemical during working careers also suffered damage to the nervous system. EPA has set the drinking water standard for 2,4,5-TP at 0.05 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to 2,4,5-TP.

(52) Xylene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that xylene is a health concern at certain levels of exposure. This organic chemical is used in the manufacture of gasoline for airplanes and as a solvent for pesticides, and as a cleaner and degreaser of metals. It usually gets into water by improper waste disposal. This chemical has been shown to damage the liver, kidneys and nervous system of laboratory animals such as rats and dogs exposed to high levels during their lifetimes. Some humans who were exposed to relatively large amounts of this chemical also suffered damage to the nervous system. EPA has set the drinking water standard for xylene at 10 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to xylene.

(53) Antimony. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that antimony is a health concern at certain levels of exposure. This inorganic chemical occurs naturally in soils, groundwater and surface waters and is often used in the flame-retardant industry. It is also used in ceramics, glass, batteries, fireworks and explosives. It may get into drinking water through natural weathering of rock, industrial production, municipal waste disposal or manufacturing processes. This chemical has been shown to decrease longevity, and altered blood levels of cholesterol and glucose in laboratory animals such as rats exposed to high levels during their lifetimes. EPA has set the drinking water standard for antimony at 0.006 parts per million (ppm) to

protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to antimony.

(54) Beryllium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that beryllium is a health concern at certain levels of exposure. This inorganic metal occurs naturally in soils, groundwater and surface waters and is often used in electrical equipment and electrical components. It generally gets into water from runoff from mining operations, discharge from processing plants and improper waste disposal. Beryllium compounds have been associated with damage to the bones and lungs and induction of cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. There is limited evidence to suggest that beryllium may pose a cancer risk via drinking water exposure. Therefore, EPA based the health assessment on noncancer effects with an extra uncertainty factor to account for possible carcinogenicity. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for beryllium at 0.004 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to beryllium.

(55) Cyanide. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that cyanide is a health concern at certain levels of exposure. This inorganic chemical is used in electroplating, steel processing, plastics, synthetic fabrics and fertilizer products. It usually gets into water as a result of improper waste disposal. This chemical has been shown to damage the spleen, brain and liver of humans fatally poisoned with cyanide. EPA has set the drinking water standard for cyanide at 0.2 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to cyanide.

(56) Nickel. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that nickel poses a health concern at certain levels of exposure. This inorganic metal occurs naturally in soils, groundwater and surface waters and is often used in electroplating, stainless steel and alloy products. It generally gets into water from mining and refining operations. This chemical has been shown to damage the heart and liver in laboratory animals when the animals are exposed to high levels over their lifetimes. EPA has set the drinking water standard at 0.1 parts per million (ppm) for nickel to protect against the risk of these adverse effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to nickel.

(57) Thallium. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that thallium is a health concern at certain high levels of exposure. This inorganic metal is found naturally in soils and is used in electronics, pharmaceuticals, and the manufacture of glass and alloys. This chemical has been shown to damage the kidneys, liver, brain and intestines of laboratory animals when the animals are exposed at high levels over their lifetimes. EPA has set the drinking water standard for thallium at 0.002 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to thallium.

(58) Benzo(a)pyrene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that benzo(a)pyrene is a health concern at certain levels of exposure. Cigarette smoke and charbroiled meats are common sources of general exposure. The major source of benzo(a)pyrene in drinking water is the leaching from coal tar lining and sealants in water storage tanks. This chemical has been shown to cause cancer in animals such as rats and mice when the animals are exposed at high levels. EPA has set the drinking water standard for benzo(a)pyrene at 0.0002 parts per million (ppm) to protect against the risk of cancer. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to benzo(a)pyrene.

(59) Dalapon. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that dalapon is a health concern at certain levels of exposure. This organ-

ic chemical is a widely used herbicide. It may get into drinking water after application to control grasses in crops, drainage ditches and along railroads. This chemical has been shown to cause damage to the kidneys and liver in laboratory animals when the animals are exposed to high levels over their lifetimes. EPA has set the drinking water standard for dalapon at 0.2 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to dalapon.

(60) Dichloromethane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that dichloromethane (methylene chloride) is a health concern at certain levels of exposure. This organic chemical is a widely used solvent. It is used in the manufacture of paint remover, as a metal degreaser and as an aerosol propellant. It generally gets into drinking water after improper discharge of waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for dichloromethane at 0.005 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe with respect to dichloromethane.

(61) Di(2-ethylhexyl)adipate. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that di(2-ethylhexyl)adipate is a health concern at certain levels of exposure. Di(2-ethylhexyl)adipate is a widely used plasticizer in a variety of products, including synthetic rubber, food packaging materials and cosmetics. It may get into drinking water after improper waste disposal. This chemical has been shown to damage liver and testes in laboratory animals such as rats and mice exposed to high levels. EPA has set the drinking water standard for di(2-ethylhexyl)adipate at 0.4 parts per million (ppm) to protect against the risk of adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to di(2-ethylhexyl)adipate.

(62) Di(2-ethylhexyl)phthalate. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that di(2-ethylhexyl)phthalate is a health concern at certain levels of exposure. Di(2-ethylhexyl)phthalate is a widely used plasticizer, which is primarily used in the production of polyvinyl chloride (PVC) resins. It may get into drinking water after improper waste disposal. This chemical has been shown to cause cancer in laboratory animals such as rats and mice exposed to high levels over their lifetimes. EPA has set the drinking water standard for di(2-ethylhexyl)phthalate at 0.004 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to di(2-ethylhexyl)phthalate.

(63) Dinoseb. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that dinoseb is a health concern at certain levels of exposure. Dinoseb is a widely used pesticide and generally gets into drinking water after application on orchards, vineyards and other crops. This chemical has been shown to damage the thyroid and reproductive organs in laboratory animals such as rats exposed to high levels. EPA has set the drinking water standard for dinoseb at 0.007 parts per million (ppm) to protect against the risk of adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to dinoseb.

(64) Diquat. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that diquat is a health concern at certain levels of exposure. This organic chemical is an herbicide used to control terrestrial and aquatic weeds. It may get into drinking water by runoff into surface water. This chemical has been shown to damage the liver, kidneys and gastrointestinal tract and causes cataract formation in laboratory animals such as dogs and rats exposed at high levels over their lifetimes. EPA has set the drinking water standard for diquat at 0.02 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA

standard is associated with little to none of this risk and should be considered safe with respect to diquat.

(65) Endothall. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that endothall is a health concern at certain levels of exposure. This organic chemical is an herbicide used to control terrestrial and aquatic weeds. It may get into water by runoff into surface water. This chemical has been shown to damage the liver, kidneys, gastrointestinal tract and reproductive system of laboratory animals such as rats and mice exposed at high levels over their lifetimes. EPA has set the drinking water standard for endothall at 0.1 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to endothall.

(66) Endrin. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that endrin is a health concern at certain levels of exposure. This organic chemical is a pesticide no longer registered for use in the United States. However, this chemical is persistent in treated soils and accumulates in sediments and aquatic and terrestrial biota. This chemical has been shown to cause damage to the liver, kidneys and heart in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. EPA has set the drinking water standard for endrin at 0.002 parts per million (ppm) to protect against the risk of these adverse health effects which have been observed in laboratory animals. Drinking water that meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to endrin.

(67) Glyphosate. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that glyphosate is a health concern at certain levels of exposure. This organic chemical is herbicide used to control grasses and weeds. It may get into drinking water by runoff into surface water. This chemical has been shown to cause damage to the liver and kidneys in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. EPA has set the drinking water standard for glyphosate at 0.7 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to glyphosate.

(68) Hexachlorobenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that hexachlorobenzene is a health concern at certain levels of exposure. This organic chemical is produced as an impurity in the manufacture of certain solvents and pesticides. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed to high levels during their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for hexachlorobenzene at 0.001 parts per million (ppm) to protect against the risk of cancer and other adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to hexachlorobenzene.

(69) Hexachlorocyclopentadiene. The United States Environmental Protection Agency (EPA) establishes drinking water standards and has determined that hexachlorocyclopentadiene is a health concern at certain levels of exposure. This organic chemical is used as an intermediate in the manufacture of pesticides and flame retardants. It may get into water by discharge from production facilities. This chemical has been shown to damage the kidneys and the stomach of laboratory animals when exposed at high levels over their lifetimes. EPA has set the drinking water standard for hexachlorocyclopentadiene at 0.05 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to hexachlorocyclopentadiene.

(70) Oxamyl. The United States Environmental Protection Agency (EPA) establishes drinking water standards and has determined that oxamyl is a health concern at certain levels of exposure. This organic chemical is used as a pesticide for the control of insects and other pests. It may get into drinking water by runoff into surface water or leaching into groundwater. This chemical has been shown to damage the kidneys of laboratory animals such as rats when exposed at high levels over their lifetimes. EPA has set the drinking water standard for oxamyl at 0.2 parts per million (ppm) to protect against the

risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to oxamyl.

(71) Picloram. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that picloram is a health concern at certain levels of exposure. This organic chemical is used as a pesticide for broadleaf weed control. It may get into drinking water by runoff into surface water or leaching into groundwater as a result of pesticide application and improper waste disposal. This chemical has been shown to cause damage to the kidneys and liver in laboratory animals such as rats when the animals are exposed at high levels over their lifetimes. EPA has set the drinking water standard for picloram at 0.5 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to picloram.

(72) Simazine. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that simazine is a health concern at certain levels of exposure. This organic chemical is an herbicide used to control annual grasses and broadleaf weeds. It may leach into groundwater or run off into surface water after application. This chemical may cause cancer in laboratory animals such as rats and mice exposed at high levels during their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for simazine at 0.004 parts per million (ppm) to reduce the risk of cancer or other adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to simazine.

(73) 1,2,4-Trichlorobenzene. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 1,2,4-trichlorobenzene is a health concern at certain levels of exposure. This organic chemical is used as a dye carrier and as a precursor in herbicide manufacture. It generally gets into drinking water by discharges from industrial activities. This chemical has been shown to cause damage to several organs, including the adrenal glands. EPA has set the drinking water standard for 1,2,4-trichlorobenzene at 0.07 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to 1,2,4-trichlorobenzene.

(74) 1,1,2-Trichloroethane. The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that 1,1,2-trichloroethane is a health concern at certain levels of exposure. This organic chemical is an intermediate in the production of 1,1-dichloroethylene. It generally gets into water by industrial discharge of wastes. This chemical has been shown to damage the kidneys and liver of laboratory animals such as rats exposed to high levels during their lifetimes. EPA has set the drinking water standard for 1,1,2-trichloroethane at 0.005 parts per million (ppm) to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to 1,1,2-trichloroethane.

(75) 2,3,7,8-TCDD (Dioxin). The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that dioxin is a health concern at certain levels of exposure. This organic chemical is an impurity in the production of some pesticides. It may get into drinking water by industrial discharge of wastes. This chemical has been shown to cause cancer in laboratory animals such as rats and mice when the animals are exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed over long periods of time. EPA has set the drinking water standard for dioxin at 0.00000003 parts per million (ppm) to reduce the risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets this standard is associated with little to none of this risk and should be considered safe with respect to dioxin.

41.10(3) Public education (lead)—action level exceedance public education requirements. A water system that exceeds the lead action level based on tap water samples collected in accordance with 41.4(1) “c” shall deliver the public education materials contained in 41.10(3) “a” and “b” in accordance with the requirements in 41.10(3) “c.”

a. Content of written materials. A water system shall include the following text in all of the printed materials it distributes through its lead public education program. Any additional information presented by a system shall be consistent with the information below and be in plain English that can be understood by laypersons.

(1) **INTRODUCTION.** The United States Environmental Protection Agency (EPA) and (insert name of water supplier) are concerned about lead in your drinking water. Although most homes have very low levels of lead in their drinking water, some homes in the community have lead levels above the EPA action level of 15 parts per billion (ppb), or 0.015 milligrams of lead per liter of water (mg/l). Under federal law we are required to have a program in place to minimize lead in your drinking water by (insert date when corrosion control will be completed for your system). This program includes corrosion control treatment, source water treatment, and public education. We are also required to replace each lead service line that we control if the line contributes lead concentrations of more than 15 ppb after we have completed the comprehensive treatment program. If you have any questions about how we are carrying out the requirements of the lead regulation, please give us a call at (insert water system's telephone number). This brochure explains the simple steps you can take to protect you and your family by reducing your exposure to lead in drinking water.

(2) **HEALTH EFFECTS OF LEAD.** Lead is a common metal found throughout the environment in lead-based paint, air, soil, household dust, food, certain types of pottery, porcelain and pewter, and water. Lead can pose a significant risk to your health if too much of it enters your body. Lead builds up in the body over many years and can cause damage to the brain, red blood cells and kidneys. The greatest risk is to young children and pregnant women. Amounts of lead that will not hurt adults can slow down normal mental and physical development of growing bodies. In addition, a child at play often comes into contact with sources of lead contamination—like dirt and dust—that rarely affect an adult. It is important to wash children's hands and toys often, and to try to make sure they only put food in their mouths.

(3) **LEAD IN DRINKING WATER.**

1. Lead in drinking water, although rarely the sole cause of lead poisoning, can significantly increase a person's total lead exposure, particularly the exposure of infants who drink baby formulas and concentrated juices that are mixed with water. The EPA estimates that drinking water can make up 20 percent or more of a person's total exposure to lead.

2. Lead is unusual among drinking water contaminants in that it seldom occurs naturally in water supplies like rivers and lakes. Lead enters drinking water primarily as a result of the corrosion, or wearing away, of materials containing lead in the water distribution system and household plumbing. These materials include lead-based solder used to join copper pipe, brass and chrome-plated brass faucets, and in some cases, pipes made of lead that connect your house to the water main (service lines). In 1986, Congress banned the use of lead solder containing greater than 0.2 percent lead, and restricted the lead content of faucets, pipes and other plumbing materials to 8.0 percent.

3. When water stands in lead pipes or plumbing systems containing lead for several hours or more, the lead may dissolve into your drinking water. This means the first water drawn from the tap in the morning, or later in the afternoon after returning from work or school, can contain fairly high levels of lead.

(4) **STEPS YOU CAN TAKE IN THE HOME TO REDUCE EXPOSURE TO LEAD IN DRINKING WATER.**

1. Despite our best efforts mentioned earlier to control water corrosivity and remove lead from the water supply, lead levels in some homes or buildings can be high. To find out whether you need to take action in your own home, have your drinking water tested to determine if it contains excessive concentrations of lead. Testing the water is essential because you cannot see, taste, or smell lead in drinking water. Some local laboratories that can provide this service are listed at the end of this booklet. For more information on having your water tested, please call (insert telephone number of water system).

2. If a water test indicates that the drinking water drawn from a tap in your home contains lead above 15 ppb, then you should take the following precautions:

Let the water run from the tap before using it for drinking or cooking anytime the water in a faucet has gone unused for more than six hours. The longer water resides in your home's plumbing the more lead it may contain. Flushing the tap means running the cold water faucet until the water gets noticeably colder, usually about 15 to 30 seconds. If your house has a lead service line to the water main, you may have to flush the water for a longer time, perhaps one minute, before drinking. Although toilet flushing or showering flushes water through a portion of your home's plumbing system, you still need to flush the water in each faucet before using it for drinking or cooking. Flushing tap water is a simple and inexpensive measure you can take to protect your family's health. It usually uses less than one or two gallons of water and costs less than (insert a cost estimate based on flushing two times a day for 30 days) per month. To conserve water, fill a couple of bottles for drinking water after flushing the tap, and whenever possible, use the first flush water to wash the dishes or water the plants. If you live in a high-rise building, letting the water flow before using it may not work to lessen your risk from lead. The plumbing systems have more, and sometimes larger pipes than smaller buildings. Ask your landlord for help in locating the source of the lead and for advice on reducing the lead level.

Try not to cook with, or drink water from, the hot water tap. Hot water can dissolve more lead more quickly than cold water. If you need hot water, draw water from the cold tap and heat it on the stove.

Remove loose lead solder and debris from the plumbing materials installed in newly constructed homes, or homes in which the plumbing has recently been replaced, by removing the faucet strainers from all taps and running the water from three to five minutes. Thereafter, periodically remove the strainers and flush out any debris that has accumulated over time.

If your copper pipes are joined with lead solder that has been installed illegally since it was banned in 1986, notify the plumber who did the work and request that the plumber replace the lead solder with lead-free solder. Lead solder looks dull gray and, when scratched with a key, looks shiny. In addition, notify the Iowa department of natural resources about the violation.

Determine whether or not the service line that connects your home or apartment to the water main is made of lead. The best way to determine if your service line is made of lead is by either hiring a licensed plumber to inspect the line or by contacting the plumbing contractor who installed the line. You can identify the plumbing contractor by checking the city's record of building permits which should be maintained in the files of the (insert name of department that issues building permits). A licensed plumber can at the same time check to see if your home's plumbing contains lead solder, lead pipes, or pipe fittings that contain lead. The public water system that delivers water to your home should also maintain records of the materials located in the distribution system. If the service line that connects your dwelling to the water main contributes more than 15 ppb to drinking water, after our comprehensive treatment program is in place, we are required to replace the line. If the line is only partially controlled by the (insert name of the city, county, or water system that controls the line), we are required to provide you with information on how to replace your portion of the service line, and offer to replace that portion of the line at your expense and take a follow-up tap water sample within 14 days of the replacement. Acceptable replacement alternatives include copper, steel, iron, and plastic pipes.

Have an electrician check your wiring. If grounding wires from the electrical system are attached to your pipes, corrosion may be greater. Check with a licensed electrician or your local electrical code to determine if your wiring can be grounded elsewhere. DO NOT attempt to change the wiring yourself because improper grounding can cause electrical shock and fire hazards.

3. The steps described above will reduce the lead concentrations in your drinking water. However, if a water test indicates that the drinking water coming from your tap contains lead concentrations in excess of 15 ppb after flushing, or after we have completed our actions to minimize lead levels, then you may want to take the following additional measures:

Purchase or lease a home treatment device. Home treatment devices are limited in that each unit treats only the water that flows from the faucet to which it is connected, and all of the devices require periodic maintenance and replacement. Devices such as reverse osmosis systems or distillers can effectively remove lead from your drinking water. Some activated carbon filters may reduce lead levels at the tap. However, all lead reduction claims should be investigated. Be sure to check the actual performance of a specific home treatment device before and after installing the unit.

Purchase bottled water for drinking and cooking.

4. You can consult a variety of sources for additional information. Your family doctor or pediatrician can perform a blood test for lead and provide you with information about the health effects of lead. State and local government agencies that can be contacted include: (insert the name of city or county department of public utilities) at (insert telephone number) can provide you with information about your community's water supply, and a list of local laboratories that have been certified by EPA for testing water quality; (insert the name of city or county department that issues building permits) at (insert telephone number) can provide you with information about building permit records that should contain the names of plumbing contractors that plumbed your home; and (insert the Iowa Department of Public Health) at (insert telephone number) or the (insert the name of the city or county health department) at (insert telephone number) can provide you with information about the health effects of lead and how you can have your child's blood tested.

5. The following is a list of some approved laboratories in your area that you can call to have your water tested for lead. (Insert names and telephone numbers of at least two laboratories.)

b. Content of broadcast materials. A water system shall include the following information in all public service announcements submitted under its lead public education program to television and radio stations for broadcasting:

(1) Why should everyone want to know the facts about lead and drinking water? Because unhealthy amounts of lead can enter drinking water through the plumbing in your home. That is why I urge you to do what I did. I had my water tested for (insert free or \$ per sample). You can contact the (insert the name of the city or water system) for information on testing and on simple ways to reduce your exposure to lead in drinking water.

(2) To have your water tested for lead, or to get more information about this public health concern, please call (insert the telephone number of the city or water system).

c. Delivery of a public education program.

(1) In communities where a significant proportion of the population speaks a language other than English, public education materials shall be communicated in the appropriate language(s).

(2) A community water system that fails to meet the lead action level on the basis of tap water samples collected in accordance with 41.4(1)"c" shall, within 60 days:

1. Insert notices in each customer's water utility bill containing the information in 41.10(3)"a," along with the following alert on the water bill itself in large print: "SOME HOMES IN THIS COMMUNITY HAVE ELEVATED LEAD LEVELS IN THEIR DRINKING WATER. LEAD CAN POSE A SIGNIFICANT RISK TO YOUR HEALTH. PLEASE READ THE ENCLOSED NOTICE FOR FURTHER INFORMATION."

2. Submit the information in 41.10(3)"a" to the editorial departments of the major daily and weekly newspapers circulated throughout the community.

3. Deliver pamphlets or brochures that contain the public education materials in 41.10(3)"a" to facilities and organizations, including the following: public schools and local school boards; city or county health departments; Women, Infants, and Children and Head Start Program(s) whenever available; public and private hospitals and clinics; pediatricians; family planning clinics; and local welfare agencies.

4. Submit the public service announcement in 41.10(3)"b" to at least five of the radio and television stations with the largest audiences that broadcast to the community served by the water system.

(3) A community water system shall repeat the tasks in 41.10(3)"c"(2)"1," "2," and "3" every 12 months and the tasks in 41.10(3)"c"(2)"4" every 6 months for as long as the system exceeds the lead action level.

(4) Within 60 days after it exceeds the lead action level, a nontransient noncommunity water system shall deliver the public education materials in 41.10(3)"a"(1), (2), and (4) as follows:

1. Post informational posters on lead in drinking water in a public place or common area in each of the buildings served by the system; and

2. Distribute informational pamphlets or brochures on lead in drinking water to each person served by the nontransient noncommunity water system.

(5) A nontransient noncommunity water system shall repeat the tasks in 41.10(3) “c”(4) at least once during each calendar year in which the system exceeds the lead action level.

(6) A water system may discontinue delivery of public education materials if the system has met the lead action level during the most recent six-month monitoring period conducted pursuant to 41.4(1) “c.” Such a system shall recommence public education in accordance with this subrule if it subsequently exceeds the lead action level during any monitoring period.

d. Supplemental monitoring and notification of results. A water system that fails to meet the lead action level on the basis of tap samples collected in accordance with 41.4(1) “c” shall offer to sample the tap water of any customer who requests it. The system is not required to pay for collecting or analyzing the sample, nor is the system required to collect and analyze the sample itself.

41.10(4) Special lead ban public notice.

a. Applicability of public notice requirement.

(1) The owner or operator of each community water system and each nontransient noncommunity water system shall, except as provided in 41.10(4) “b,” issue a notice to persons served by the system that may be affected by lead contamination of their drinking water. The department may require subsequent notices. The owner or operator shall provide notice under this subparagraph even if there is no violation of the lead action level as prescribed in 41.4(1) “b.”

(2) Notice required under 41.10(4) “a” is not required if the system demonstrates to the department that the water system, including the residential and nonresidential portions connected to the water system, are lead-free as defined in 567—40.2(455B).

b. Manner of notice. Notice shall be given to persons served by the system either by three newspaper notices (one for each of three consecutive months); or once by mailing the notice with the water bill or in a separate mailing; or once by hand delivery. For nontransient noncommunity water systems, notice may be given by continuous posting. If posting is used, the notice shall be posted in a conspicuous place in the area served by the system and continue for three months.

c. General content of public notice.

(1) Notices issued under this subparagraph shall provide a clear and readily understandable explanation of the potential sources of lead in drinking water, potential adverse health effects, reasonably available methods of mitigating known or potential lead content in drinking water, any steps the water system is taking to mitigate lead content in drinking water, and the necessity for seeking alternative water supplies, if any. Use of the mandatory language in 41.10(4) “d” in the notice will be sufficient to explain potential adverse health effects.

(2) Each notice shall also include specific advice on how to determine if materials containing lead have been used in homes or the water distribution system and how to minimize exposure to water likely to contain high levels of lead. Each notice shall be conspicuous and shall not contain unduly technical language, unduly small print, or similar problems that frustrate the purpose of the notice. Each notice shall contain the telephone number of the owner, operator, or designee of the public water system as a source of additional information regarding the notice. Where appropriate, the notice shall be multilingual.

d. Mandatory health effects information. When providing the information in public notices required under 41.10(4) “c” on the potential adverse health effects of lead in drinking water, the owner or operator of the water system shall include the following specific language in the notice:

“The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that lead is a health concern at certain levels of exposure. There is currently a standard of 0.050 parts per million (ppm). Based on new health information, EPA is likely to lower the standard significantly.

“Part of the purpose of this notice is to inform you of the potential adverse health effects of lead. This is being done even though your water may not be in violation of the current standard.

“EPA and others are concerned about lead in drinking water. Too much lead in the human body can cause serious damage to the brain, kidneys, nervous system, and red blood cells. The greatest risk, even with short-term exposure, is to young children and pregnant women.

“Lead levels in your drinking water are likely to be highest:

- if your home or water system has lead pipes, or
- if your home has copper pipes with lead solder, or
- if your home is less than five years old, or
- if you have soft or acidic water, or
- if water sits in the pipes for several hours.”

e. Public notification by the department. The department may give notice to the public required by this subrule on behalf of the owner or operator of the public water system if the department complies with the requirements of this subrule. However, the owner or operator of the public water system remains legally responsible for ensuring that the requirements of this subrule are met.

41.10(5) Required public notification for operation permits. When the director determines that a public water supply cannot promptly comply with one or more maximum contaminant levels of 41.2(455B) through 41.8(455B) and that there is no immediate, unreasonable risk to the health of persons served by the system, a draft operation permit or modified permit will be formulated, which may include interim contaminant levels or a compliance schedule. Prior to issuance of a final permit, notice and opportunity for public participation must be given in accordance with 41.10(5). The notice shall be circulated in a manner designed to inform interested and potentially interested persons of any proposed interim contaminant level or compliance schedule.

a. Preparation of notice. The public notice shall be prepared by the department and circulated by the applicant within its geographical area as described in 41.10(2). The public notice shall be mailed by the department to any person upon request.

b. Public comment period. The department shall provide a period of not less than 30 days following the date of the public notice during which time interested persons may submit their written views on the tentative determinations with respect to the operation permit. All written comments submitted during the 30-day comment period shall be retained by the department and considered by the director in the formulation of the director’s final determination with respect to the operation permit. The period for comment may be extended at the discretion of the department.

c. Content of notice. The contents of the public notice of a proposed operation permit shall include at least the following:

- (1) The name, address, and telephone number of the department.
- (2) The name and address of the applicant.
- (3) A statement of the department’s tentative determination to issue the operation permit.
- (4) A brief description of each applicant’s water supply operations which necessitate the proposed permit conditions.
- (5) A brief description of the procedures for the formulation of final determinations, including the 30-day comment period required by 41.10(5)“b.”
- (6) The right to request a public hearing pursuant to this paragraph and any other means by which interested persons may influence or comment upon those determinations.
- (7) The address and telephone number of places at which interested persons may obtain further information, request a copy of the draft permit prepared pursuant to this paragraph, and inspect and copy the application forms and related documents.

d. Public hearings on proposed operation permits. The applicant or any interested agency, person or group of persons may request or petition for a public hearing with respect to the proposed action. Any such request shall clearly state issues and topics to be addressed at the hearing. Any such request or petition for public hearing must be filed with the director within the 30-day period prescribed in 41.10(5)“b” and shall indicate the interest of the party filing such request and the reasons why a hearing is warranted. The director shall hold an informal and noncontested case hearing if there is a significant public interest (including the filing of requests or petitions for such hearing) in holding such a hearing. Frivolous or insubstantial requests for hearing may be denied by the director. Instances of doubt should be resolved in favor of holding the hearing. Any hearing held pursuant to this subrule shall be held in the geographical area of the system, or other appropriate area at the discretion of the director, and may, as appropriate, consider related groups of permit applications.

e. Public notice of public hearings.

(1) Public notice of any hearing held pursuant to this paragraph shall be circulated at least as widely as the notice under 41.10(5)“a,” at least 30 days in advance of the hearing.

(2) The contents of the public notice of any hearing held pursuant to this paragraph shall include at least the following:

1. The name, address, and telephone number of the department;
2. The name and address of each applicant whose application will be considered at the hearing;
3. A brief reference to the public notice previously issued, including identification number and date of issuance;
4. Information regarding the time and location for the hearing;
5. The purpose of the hearing;
6. A concise statement of the issues raised by the person requesting the hearing;
7. The address and telephone number of the premises where interested persons may obtain further information, request a copy of the draft operation permit or modification prepared pursuant to this paragraph, and inspect and copy the application forms and related documents; and
8. A brief description of the nature of the hearing, including the rules and procedures to be followed.

f. Decision by the director. Within 30 days after the termination of the public hearing held pursuant to this paragraph or, if no public hearing is held, within 30 days after the termination of the period for requesting a hearing, the director shall issue or deny the operation permit.

41.10(6) Record maintenance requirements. Any owner or operator of a public water system subject to the provisions of this rule shall retain on its premises or at a convenient location near its premises the following records:

a. Bacterial and chemical records. Records of bacteriological analyses made pursuant to this subrule shall be kept for not less than five years. Records of chemical analyses made pursuant to 567—Chapter 41 shall be kept for not less than ten years. Actual laboratory reports shall be kept, or data may be transferred to tabular summaries, provided that the following information is included:

- (1) The date, place, and time of sampling, and the name of the person who collected the sample;
- (2) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample;
- (3) Date of analysis;
- (4) Laboratory and person responsible for performing analysis;
- (5) The analytical technique or method used; and
- (6) The results of the analysis.

b. Records of action. Records of action taken by the system to correct violations of primary drinking water regulations (including administrative orders) shall be kept for not less than three years after the last action taken with respect to the particular violation involved.

c. Reports and correspondence. Copies of any written reports, summaries, or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local, state or federal agency, shall be kept for a period of not less than ten years after completion of the sanitary survey involved.

d. Operation or construction permits. Records concerning an operation or a construction permit issued pursuant to 567—Chapter 43 to the system shall be kept for a period ending not less than five years after the system achieves compliance with the maximum contaminant level, the action level, the treatment technique requirement, the health advisory level, or after the system in question completes the associated construction project.

e. Lead and copper record-keeping requirements. A system subject to the requirements of 41.10(7) shall retain on its premises original records of all data and analyses, reports, surveys, letters, evaluations, schedules, and any other information required by 41.4(455B) and 567—Chapter 43. Each water system shall retain the records required by this subrule for 12 years.

41.10(7) Lead and copper reporting requirements. All water systems shall report all of the following information to the department in accordance with this subrule.

a. Reporting requirements for tap water monitoring for lead and copper and for water quality parameter monitoring.

(1) A water system shall report the information specified below for all tap water samples within the first ten days following the end of each applicable monitoring period specified in 41.4(455B) (i.e., every six months, annually, or every three years).

1. The results of all tap samples for lead and copper including the location of each site and the criteria under which the site was selected for the system's sampling pool;

2. A certification that each first draw sample collected by the water system is one liter in volume and, to the best of their knowledge, has stood motionless in the service line, or in the interior plumbing of a sampling site, for at least six hours;

3. Where residents collected samples, a certification that each tap sample collected by the residents was taken after the water system informed them of proper sampling procedures specified in 41.4(1) "c"(2) "2";

4. The 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period (calculated in accordance with 41.4(1) "b");

5. With the exception of initial tap sampling conducted pursuant to 41.4(1) "c"(4) "1," the system shall designate any site which was not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed;

6. The results of all tap samples for pH and, where applicable, alkalinity, calcium, conductivity, temperature, and orthophosphate or silica collected under 41.4(1) "d"(2) through (5);

7. The results of all samples collected at the entry point(s) to the distribution system for applicable water quality parameters under 41.4(1) "d"(2) and (5).

(2) By the applicable date in 41.4(1) "c"(4) "1" for commencement of monitoring, each community water system which does not complete its targeted sampling pool with tier 1 sampling sites meeting the criteria in 41.4(1) "c"(1) "3" shall send a letter justifying its selection of tier 2 and tier 3 sampling sites under 41.4(1) "c"(1) "4" and "5," whichever is applicable.

(3) By the applicable date in 41.4(1) "c"(1) "7" for commencement of monitoring, each nontransient noncommunity water system which does not complete its sampling pool with tier 1 sampling sites meeting the criteria in 41.4(1) "c"(1) "6" shall send a letter to the department justifying its selection of sampling sites under 41.4(1) "c"(1) "7."

(4) By the applicable date in 41.4(1) "c"(4) "1" for commencement of monitoring, each water system with lead service lines that is not able to locate the number of sites served by such lines required under 41.4(1) "c"(1) "8" shall send a letter to the department demonstrating why it was unable to locate a sufficient number of such sites based upon the information listed in 41.4(1) "c"(1) "2."

(5) Each water system that requests that the department reduce the number and frequency of sampling shall provide the information required under 41.4(1) "c"(4) "4."

b. Source water monitoring reporting requirements.

(1) A water system shall report the sampling results for all source water samples collected in accordance with 41.4(1) "e" within the first ten days following the end of each source water monitoring period (i.e., annually, per compliance period, per compliance cycle) specified in 41.4(1) "e."

(2) With the exception of the first round of source water sampling conducted pursuant to 41.4(1) "e"(2), the system shall specify any site which was not sampled during previous monitoring periods, and include an explanation of why the sampling point has changed.

c. Corrosion control treatment reporting requirements. By the applicable dates under 567—subrule 43.8(1), systems shall report the following information:

(1) For systems demonstrating that they have already optimized corrosion control, information required in 567—subparagraph 43.8(1) "b"(2) or (3).

(2) For systems required to optimize corrosion control, their recommendation regarding optimal corrosion control treatment under 567—paragraph 43.8(2) "a."

(3) For systems required to evaluate the effectiveness of corrosion control treatments under 567—paragraph 43.8(2) "c," the information required by that paragraph.

(4) For systems required to install optimal corrosion control designated by the department under 567—paragraph 43.8(2)“d,” a letter certifying that the system has completed installing that treatment.

d. Source water treatment reporting requirements. By the applicable dates in 567—subparagraph 43.8(3)“b”(1), systems shall provide the following information to the department:

(1) If required under 567—subparagraph 43.8(3)“b”(1), their recommendation regarding source water treatment;

(2) For systems required to install source water treatment under 567—subparagraph 43.8(3)“b”(1), a letter certifying that the system has completed installing the treatment designated by this department within 24 months after the department designated the treatment.

e. Lead service line replacement reporting requirements. Systems shall report the following information to demonstrate compliance with the requirements of 567—subrule 43.8(4):

(1) Within 12 months after a system exceeds the lead action level in sampling referred to in 567—paragraph 43.8(4)“a,” the system shall demonstrate in writing to the department that it has conducted a materials evaluation, including the evaluation pursuant to 41.4(1)“c”(1) to identify the initial number of lead service lines in its distribution system, and shall provide the department with the system’s schedule for replacing annually at least 7 percent of the initial number of lead service lines in its distribution system.

(2) Within 12 months after a system exceeds the lead action level in sampling referred to in 567—paragraph 43.8(4)“a” and every 12 months thereafter, the system shall demonstrate in writing that the system has either:

1. Replaced in the previous 12 months at least 7 percent of the initial lead service lines (or a greater number of lines specified by the department under 567—paragraph 43.8(4)“f” in its distribution system), or

2. Conducted sampling which demonstrates that the lead concentration in all service line samples from individual line(s), taken pursuant to 41.4(1)“c”(2)“3,” is less than or equal to 0.015 mg/l. In such cases, the total number of lines replaced and which meet the criteria in 567—paragraph 43.8(4)“c” shall equal at least 7 percent of the initial number of lead lines identified under 567—paragraph 43.8(4)“c” or the percentage specified by the department under 567—paragraph 43.8(4)“f.”

(3) The annual letter submitted to the department under 41.10(7)“e”(2) shall contain the following information:

1. The number of lead service lines scheduled to be replaced during the previous year of the system’s replacement schedule;

2. The number and location of each lead service line replaced during the previous year of the system’s replacement schedule;

3. If measured, the water lead concentration and location of each lead service line sampled, the sampling method, and the date of sampling.

(4) As soon as practicable, but in no case later than three months after a system exceeds the lead action level in sampling referred to in 567—paragraph 43.8(4)“a,” any system seeking to rebut the presumption that it has control over the entire lead service line pursuant to 567—paragraph 43.8(4)“d” shall submit a letter to the department describing the legal authority (e.g., state statutes, municipal ordinances, public service contracts or other applicable legal authority) which limits the system’s control over the service lines and the extent of the system’s control.

f. Public education program reporting requirements. By December of each year, a water system that is subject to the public education requirements in 41.10(3) shall submit a letter to the department demonstrating that the system has delivered the public education materials that meet the content requirements in 41.10(3)“a” and “b” and the delivery requirements in 41.10(3)“c.” This information shall include a list of all the newspapers, radio stations, television stations, facilities and organizations to which the system delivered public education materials during the previous year. The water system shall submit the letter annually for as long as it exceeds the lead action level.

g. Reporting of additional monitoring data. A system which collects sampling data in addition to that required by 41.10(7) shall report the results to the department by the end of the applicable monitoring period under 41.4(1)“c,” “d,” and “e” during which the samples are collected.

567—41.11(455B) Unregulated contaminant monitoring and prohibition on lead use.**41.11(1) Unregulated monitoring for organic chemicals (VOCs).**

a. Applicability. Community and nontransient noncommunity water systems shall monitor for the contaminants listed in 41.11(1)“*b.*”

b. Volatile organic chemical contaminants (VOCs). Community water systems and nontransient, noncommunity water systems shall monitor for the following contaminants except as provided in 41.11(1)“*c*”(4) of this subrule:

- (1) Chloroform
- (2) Bromodichloromethane
- (3) Chlorodibromomethane
- (4) Bromoform
- (5) Chlorobenzene
- (6) m-Dichlorobenzene
- (7) 1,1-Dichloropropene
- (8) 1,1-Dichloroethane
- (9) 1,1,2,2-Tetrachloroethane
- (10) 1,3-Dichloropropane
- (11) Chloromethane
- (12) Bromomethane
- (13) 1,2,3-Trichloropropane
- (14) 1,1,1,2-Tetrachloroethane
- (15) Chloroethane
- (16) 2,2-Dichloropropane
- (17) o-Chlorotoluene
- (18) p-Chlorotoluene
- (19) Bromobenzene
- (20) 1,3-Dichloropropene

c. Special organic chemical (VOC) monitoring protocol.

(1) Surface water systems shall sample at points in the distribution system representative of each water source or at entry points to the distribution system after any application of treatment. The minimum number of samples is one year of quarterly samples per water source.

(2) Groundwater systems shall sample at points of entry to the distribution system representative of each well after any application of treatment. The minimum number of samples is one sample per entry point of the distribution system.

(3) The department may require confirmation samples for positive or negative results.

(4) Monitor for ethylene dibromide (EDB) and 1,2-Dibromo-3-chloropropane (DBCP) only if the department determines they are vulnerable to contamination by either or both of these substances. For the purpose of 41.11(1)“*c.*” a vulnerable system is defined as a system which is potentially contaminated by EDB and DBCP, including surface water systems where these two compounds are applied, manufactured, stored, disposed of, or shipped upstream, and for groundwater systems in areas where the compounds are applied, manufactured, stored, disposed of, or shipped in the groundwater recharge basin, or for groundwater systems, shallow wells as defined in 567—40.2(455B) that are less than 400 feet and deep wells as defined in 567—40.2(455B) that are less than 200 feet from underground storage tanks that contain leaded gasoline.

(5) Monitoring for the following compounds is required at the discretion of the department.

1. 1,2,4-Trimethylbenzene
2. 1,2,3-Trichlorobenzene
3. n-Propylbenzene
4. n-Butylbenzene
5. Naphthalene
6. Hexachlorobutadiene
7. 1,3,5-Trimethylbenzene

8. p-Isopropyltoluene
9. Isopropylbenzene
10. Tert-butylbenzene
11. Sec-butylbenzene
12. Fluorotrichloromethane
13. Dichlorodifluoromethane
14. Bromochloromethane

(6) Small system monitoring waivers. Instead of performing the monitoring required by this subrule, a community water system or nontransient noncommunity water system serving fewer than 150 service connections may send a letter to the department stating that its system is available for sampling. The letter must be sent to the state no later than January 1, 1991. The system shall not send such samples to the department, unless requested to do so by the department.

(7) Repeat monitoring. All community and nontransient, noncommunity water systems shall repeat the unregulated contaminant monitoring required in this subrule no less frequently than every five years from the dates specified in 41.11(1)“a.”

(8) Composite samples. The department may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five sampling points are allowed (for the substances in 41.11(1)“b” or “c”). Compositing of samples must be done in the laboratory and the composite sample must be analyzed within 14 days of collection. If the population served by the system is greater than 3,300 persons, then compositing may only be permitted by the department at sampling points within a single system. In systems serving less than or equal to 3,300 persons, the department may permit compositing among different systems provided the five-sample limit is maintained.

d. Analytical methods.

(1) Analysis under this subrule shall be conducted using the recommended EPA methods as follows, or their equivalent as determined by EPA: 502.1, “Volatile Halogenated Organic Compounds in Water by Purge and Trap Gas Chromatography,” 503.1, “Volatile Aromatic and Unsaturated Organic Compounds in Water by Purge and Trap Gas Chromatography,” 524.1, “Volatile Organic Compounds in Water by Purge and Trap Gas Chromatography/Mass Spectrometry,” 524.2, “Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography/Mass Spectrometry,” or 502.2, “Volatile Organic Compounds in Water by Purge and Trap Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series.” These methods are contained in “Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water,” September 1986, available from the Drinking Water Public Docket or the National Technical Information Service (NTIS), NTIS PB91-231480 and PB91-146027, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

(2) Analysis under this subrule shall only be conducted by laboratories approved under 567—Chapter 83.

41.11(2) Inorganic and organic chemicals (VOCs) special monitoring.

a. Applicability. Monitoring for unregulated contaminants. Monitoring of the contaminants listed in 41.11(2)“b” and 41.3(1)“f” shall be conducted as follows:

(1) Sampling for organic contaminants. Each community and nontransient noncommunity water system shall take four consecutive quarterly samples at each sampling point for each contaminant listed in 41.11(2)“b” and report the results to the department. Monitoring must be completed by December 31, 1995, and take place during the calendar quarter which is specified by the department.

(2) Sampling for inorganic contaminants. Each community and nontransient noncommunity water system shall take one sample at each sampling point for each contaminant listed in 41.11(2)“b” and report the results to the department. Monitoring must be completed by December 31, 1995.

b. MCLs (unregulated-organics).

Unregulated organic chemical contaminants.

<u>Organic Contaminants</u>	<u>EPA Analytical Method</u>
Aldrin	505, 508, and 525
Butachlor	507 and 525
Carbaryl	581.1
Dicamba	515.1
Dieldrin	505, 508, and 525
3-Hydroxycarbofuran	581.1
Methomyl	531.1
Metolachlor	507, 525
Metribuzin	507, 508, and 525
Propachlor	507, 525

Analytical Methods for Unregulated Inorganic Contaminants:

<u>Inorganic Contaminants</u>	<u>EPA Analytical Method</u>
Sulfate	Colorimetric

c. Monitoring protocols.

(1) Groundwater sampling protocols. Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(2) Surface water sampling protocols. Surface water systems shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant. For purposes of this subparagraph, surface water systems include systems with a combination of surface and ground sources.

(3) Multiple sources. If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water representative of all sources is being used).

(4) Sampling waivers. Each community and nontransient noncommunity water system may apply to the department for a waiver from the requirements of 41.11(2)“c”(1) and (2).

(5) Bases of sampling waivers. The department may grant a waiver for the requirements of 41.11(2)“a”(1) based on the criteria specified in 41.3(455B) and 41.5(455B). The department may grant a waiver from the requirement of 41.11(2)“a”(2) if previous analytical results indicate contamination would not occur, provided this data was collected after January 1, 1990.

(6) Confirmation sampling. A confirmation sample for positive or negative results may be required.

(7) Composite sampling. The department may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five sampling points are allowed. Compositing of samples must be done in the laboratory and the composite sample must be analyzed within 14 days of collection. If the population served by the system is greater than 3,300 persons, then compositing may only be permitted by the department at sampling points within a single system. In systems serving less than or equal to 3,300 persons, the department may permit compositing among different systems provided the five-sample limit is maintained.

(8) Small system exemptions. Instead of performing the monitoring required by this subrule, a community water system or nontransient noncommunity water system serving fewer than 150 service connections may send a letter stating that the system is available for sampling. This letter must be sent

by January 1, 1994. The system shall not send such samples, unless requested to do so by the department.

41.11(3) *Special monitoring for sodium.* Suppliers of water for community public water systems shall collect and have analyzed one sample per source or plant, for the purpose of determining the sodium concentration in the distribution system. Systems utilizing multiple wells, drawing raw water from a single aquifer may, with departmental approval, be considered as one source for determining the minimum number of samples to be collected. Sampling frequency and approved analytical methods are as follows:

- a. Systems utilizing a surface water source, in whole or in part, shall monitor for sodium at least once annually;
- b. Systems utilizing groundwater sources shall monitor at least once every three years;
- c. Suppliers may be required to monitor more frequently where sodium levels are variable;
- d. Analyses for sodium shall be performed using the flame photometric method in accordance with the procedures described in "Standard Methods," pp. 250-253; or by Method 273.1, Atomic Absorption-Direct Aspiration or Method 273.2, Atomic Absorption-Graphite Furnace, in "Methods for Chemical Analysis of Water and Waste," EMSL, Cincinnati, EPA, 1979; or by Method D1428-64(a) in Annual Book of ASTM Standards, Part 31, Water.

567—41.12(455B) *Alternative analytical techniques.* With the written permission of this department, concurred in by the EPA, an alternative analytical technique may be employed. An alternative technique shall be acceptable only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any maximum contaminant level. The use of the alternative analytical technique shall not decrease the frequency of monitoring required by 41.2(455B) through 41.8(455B).

567—41.13(455B) *Monitoring of interconnected public water supply systems.* When a public water supply system supplies water to one or more other public water supply systems, the department may modify the monitoring requirements imposed by this part to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the department and concurred in by the administrator of the U.S. Environmental Protection Agency.

567—41.14(455B) *Department analytical results used to determine compliance.* Analytical results or other information compiled by departmental staff may be used to determine compliance with the maximum contaminant levels, action levels, or treatment techniques listed in 567—Chapters 41 and 43 or for initiating remedial action with respect to these violations.

567—41.15(455B) *Monitoring of other contaminants.* If the department determines that other contaminants are present in a public water supply, and the contaminants are known to pose, or scientific evidence strongly suggests that they pose, a threat to human health, the supplier of water may be required to monitor for such contaminants. The supplier of water will monitor at a frequency and in a manner which will adequately identify the magnitude and extent of the contamination. The monitoring frequency and sampling location will be determined by the department. All analytical results will be obtained using approved EPA methods and all analytical results will be submitted to the department for review and evaluation. Any monitoring required under this paragraph will be incorporated into an operation permit or an order.

These rules are intended to implement Iowa Code chapter 455B, division III, part 1.

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◇Two ARCs

*Effective date of [ARC4359A] 41.3(1)“b”(2)“3”; 41.3(1)“c”(2)“4,” new sentence at end; 41.3(1)“c”(3)“6,” “10”; 41.3(1)“c”(8), first sentence; 41.4(1)“d”(5)“4”; 41.5(1)“a”; 41.10(7)“a”(3); 41.11(2)“a”; 41.11(2)“c”(4); 41.11(2)“c”(5), first sentence, delayed 70 days by the Administrative Rules Review Committee at its meeting held November 9, 1993; delay lifted by the Committee December 14, 1993.

CHAPTER 42 LABORATORY CERTIFICATION

Rescinded IAB 4/10/96, effective 5/15/96; see 567—Chapter 83.